RPSC

RAS Prelims Exam 2026

SCIENCE & TECHNOLOGY

Volume-6

CHAPTERWISE MCQ BANK

- As per Syllabus released by RPSC
- Specialised Study Material prepared by Experts

NODIA

Scan QR for Demo PDF

Nodia

GET ALL STUDY MATERIAL IN ONE APP!

- Textbooks
- Previous Year Chapterwise Question Banks
- 30 Sets Sample Papers
- Worksheets

FREE!

DOWNLOAD NOW!

SCAN & DOWNLOAD

GET IT ON Google Play

RPSC

RAJASTHAN PUBLIC SERVICE COMMISSION

RAS

PRELIMS EXAM 2026

GENERAL KNOWLEDGE AND GENERAL SCIENCE

Volume 6

SCIENCE & TECHNOLOGY

CHAPTER-WISE MCQ BANK

As Per Syllabus Released By RPSC

NODIA

Downloaded from www.pdf.tube

RPSC RAS PRELIMS VOLUME 6
Edition April 2026
Published by :NODIA
An Imprint of NODIA EDITIONS LLP

Information contained in this book has been obtained by author, from sources believes to be reliable. However, neither NODIA nor its author guarantee the accuracy or completeness of any information herein and NODIA nor its author shall be responsible for any error, omissions, or damages arising out of use of this information. This book is published with the understanding that NODIA and its author are supplying information but are not attempting to render engineering or other professional services.

© NODIA EDITIONS LLP

MRP ₹490.00

This book is available on amazon and flipkart only and not available in market.

NODIA EDITIONS LLP
125, Sector 6, Vidyadhar Nagar, Jaipur 302039
Phone :+91 9001005245
email : mail@nodia.in

CONTENTS

Ch 01	Basics of Everyday Science	9
Ch 02	Computers, Information and Communication Technology	51
Ch 03	Defence and Space Technology in India	97
Ch 04	Genetics, Biotechnology & Nanotechnology	148
Ch 05	Human Health, Food Nutrition and Public Health Programmes	194
Ch 06	Environmental & Ecological Changes and Their Impact Assessment	239
Ch 07	Biodiversity, Conservation of Natural Resources and Sustainable Development	283
Ch 08	Agriculture, Horticulture, Forestry and Animal Husbandry Rajasthan	332
Ch 09	Key Government Programmes and Policies	378
Ch 10	Recent Advances, Indian Contributors & Indigenization	427

****

Click Here to Buy book on Amazon

RAJASTHAN PUBLIC SERVICE COMMISSION, AJMER

Rajasthan State and Subordinate Services Combined Competitive (Preliminary) Examination

-: Scheme & Syllabus of Examination: - Dated 09-01-2026

The Preliminary Examination will consist of one paper on the subject specified below, which will be of objective type and carry a maximum of 200 marks.

The examination is meant to serve as a screening test only. The Standard of the paper will be that of a Bachelor's Degree Level. The marks obtained in the Preliminary Examination by the candidates, who are declared qualified for admission to Main Examination will not be counted for determining their final order of merit.

Subject	Max Marks	Time
General Knowledge and General Science	200	3 Hours

Note-

1. There will be 150 questions of multiple choice (Objective Type), carrying equal marks.
2. There will be negative marking 1/3 mark will be deducted for each wrong answer.

NODIA

History, Art, Culture, Literature, Tradition & Heritage of Rajasthan

- Pre-historical sites of Rajasthan- from Palaeolithic to Chalcolithic and Bronze Age, Society and Culture of ancient Rajasthan.
- Sources of Rajasthan History: Archaeological, Archival, Literary and Numismatic.
- Political and Cultural achievements of prominent rulers of major dynasties – Cooperation and Resistance with central power, Administrative and Revenue System in Medieval Rajasthan.
- Political and Social condition in 18th-19th Century, Peasant and Tribal movements in 20th century, Praja Mandal movements and Mass awakening, Integration of Rajasthan.
- Architectural Tradition of Rajasthan- temples, forts, palaces, Monuments, man-made waterbodies, Various schools of paintings and handicrafts: Performing Art: Folk Dances & Drama. Music (Classical and Folk) & Instruments.
- Language & Literature: Dialects of Rajasthani Language. Literature of Rajasthani language and Folk literature, Religious Life: Religious Communities, Saints and Sects in Rajasthan. Folk Deities of Rajasthan. Religious practices.
- Social Life in Rajasthan: Fairs and festivals; Social customs and traditions; attires and ornaments.
- Leading Personalities of Rajasthan.

Indian History

Ancient & Medieval Period:

- Cultural Foundations of India - Indus and Vedic Age; Religious ideas of 6th Century BC- Ajivakas, Buddhism and Jainism.
- Achievements of prominent rulers of major dynasties: Maurya, Kushan, Satavahan, Gupta, Chalukya, Pallava and Chola.
- Art and Architecture & scientific development in Ancient India.
- Indian Knowledge and Value System: Varna Ashram, Purushartha, Sanskara, Philosophy and Education System.
- Sultanate Period: Achievements of prominent dynasties, Political & Cultural achievements of Vijaynagar empire.
- Mughal Period: Administration and various policies; Marathas.
- Development of Art & Architecture, literature, Paintings and Music during medieval period.
- Religious movements and contribution of Bhakti & Sufi movement.

Modern Period (from early 19th century to 2000):

- British Imperialism and Resistance – Maratha, Mysore, Sikh. Revolt of 1857. British Political, Economic and Administrative policies. Emergence of Nationalism, Socio religious movements
- The Freedom Struggle & Indian National Movement- Evolution, stages and major events. Revolutionary and various regional movements towards freedom and partition.
- Post Independent Nation Building (up to 2000), Reorganization of state, Institutional building during Nehruvian age, Planning & Economic reforms, development of Science and Technology.

Downloaded from www.pdf.tube

Geography of World and India

World Geography:

- Physical Aspects: - Mountains, Plateaus, Plains & Deserts
- Major Rivers & Lakes
- Natural Vegetation
- Agriculture: Type, Distribution & important crops
- Major Industrial Regions and Industries.
- Transport Network.
- Environmental Issues- Desertification, Deforestation, Climate Change & Global Warming, Ozone Layer Depletion.

Geography of India:

- Physiographic division
- Climate
- Major Rivers and Lakes
- Irrigation
- Agriculture: Important Crops
- Minerals- Metallic and Non- Metallic
- Major Industrial Regions and Important industries

Geography of Rajasthan

- Rajasthan: Location, Extent and Physiography
- Rivers and Lakes
- Climatic characteristics
- Natural Vegetation, Biodiversity & Conservation
- Soil
- Agriculture
- Livestock
- Irrigation
- Population-Growth, Density, Literacy, Sex-ratio
- Urbanization
- Tribes
- Minerals-Metallic & Non-Metallic
- Tourism

Indian Constitution, Political System & Governance

- Framing of the Constitution, Preamble, Citizenship, Fundamental Rights, Directive Principles of State Policy and fundamental Duties.
- Union Government- Executive, Legislature and Judiciary.
- Union State Relations, Emergency provisions.
- Urban and Rural local Government.
- Election Commission, Union Public Service Commission, National Human Rights Commission, National Commission for women, National Commission for Protection of Child Rights and Niti Aayog.
- Public Policy, Citizen Charter, Social Audit and Grievance Redressal system.
- Lokpal, Central Vigilance Commission, Central Information Commission.

NODIA

Political and Administrative System of Rajasthan

- Governor, Chief Minister and Council of Ministers, Rajasthan Legislative Assembly, the Rajasthan High Court, Subordinate Courts and other judicial bodies, Advocate General.
- Chief Secretary State Secretariate, Directorates of Various departments, Divisional Commissioner, District Collector/District Magistrate, Superintendent of Police, Sub-divisional Officer, Tehsildar.
- Rajasthan Public Service Commission, Rajasthan State Election Commission, Rajasthan Information Commission, Rajasthan State Women Commission, Board of Revenue, Lokayukt.
- Administration of Panchayati Raj and Municipalities in Rajasthan.

Economic Concepts and Indian Economy

- Economic Growth and Development. Environmental Degradation and Sustainable Development.
- Measurement of Development – Conventional Method, Human Development Index and Related Indices.
- Role of Monetary and Fiscal Policy in Economic Development. Recent Budget of Government of India and Resource Mobilization.
- Fiscal Federalism – Centre- State Financial Relations and Finance Commission.
- Agricultural Development- Institutional and Technological Aspects. Reforms in Indian Agriculture. Challenges and Government Initiatives.
- Industrial Growth, Pattern and Policy and Industrial Reforms. Economic Reforms-Liberalization, Privatization and Globalization.
- Role of Service Sector in Economic Growth - Challenges and Opportunities. Energy, Transportation and Communication.
- Skill Development and Employment Generation – Programmes and Polices. Social Justice and Empowerment.

Economy of Rajasthan

- Macro Overview of Economy and State budget.
- Current Status, Issues and Government Initiatives of Agriculture, Industry and Service Sector.
- Infrastructure Development: Energy, Transportation and Communication.
- Rural Development, Panchayati Raj and State Finance Commission.
- Basic Social Services – Education and Health.
- Major Welfare Schemes of Government of Rajasthan.

Science & Technology

- Basics of Everyday Science.
- Computers, Information and Communication Technology.
- Defence and Space Technology with special reference to India.
- Inheritance and variation; Genetic Engineering, Biotechnology and Nanotechnology.
- Human Health Care; Food and Nutrition; Diseases and Public Health Programs.
- Environmental & Ecological Changes and their Impact assessment.
- Biodiversity; Conservation of Natural Resources and Sustainable Development.
- Agriculture, Horticulture, Forestry and Animal Husbandry with special reference to Rajasthan.

Click Here to Buy book on Amazon

- Key Government Programs & Policies related to Science & Technology in Rajasthan and India
- Recent Scientific & Technological advancements; Contribution of Indians in Science & Technology; Indigenization of Science & Technology

Reasoning & Mental Ability

Reasoning (Deductive, Inductive, Abductive):

- Statement and Assumptions
- Statement and Argument
- Statements and Conclusion
- Statement and Courses of Action
- Analytical Reasoning/ Critical Reasoning

Mental Ability:

- Number /Letter sequences
- Coding/Decoding
- Problems related to Relations
- Direction sense test
- Logical Venn diagram
- Ranking and Sitting Arrangement
- Shapes and their sub sections

Basic Numeracy:

- Ratio, Proportion and Partnership, Profit and Loss
- Percentage
- Simple and Compound Interest
- Perimeter and Area of Plane figures
- Data Analysis (Tables, Bar diagram, Line graph, Pie-chart)
- Mean (Arithmetic, Geometric and Harmonic), Median and Mode
- Permutation and Combination
- Probability (Simple Problems)

Current Affairs & Issues (with special reference to Rajasthan)

- Important personalities, places, and contemporary issues of relevance.
- Newly launched schemes, programs, and initiatives pertaining to welfare and development.
- Major economic and political developments.
- Significant events and achievements related to sports and games.
- Major awards, publications and distinguished authors.
- Rajasthan Public Examination (Measures for Prevention of Unfair Means in Recruitment) Act, 2022.

Ajmer **Chief Controller of Examination**

09-01-2026

Downloaded from www.pdf.tube

CHAPTER 01

Basics of Everyday Science

1. Which of the following best defines a hypothesis in the context of the scientific method?
(1) A proven fact that has been repeatedly tested
(2) A tentative, testable explanation for an observed phenomenon
(3) The final conclusion drawn after conducting an experiment
(4) A mathematical formula used to calculate experimental error
(5) Question not attempted

2. In a controlled scientific experiment, what is the primary purpose of the control group?
(1) To provide a standard baseline for comparison with the test group
(2) To ensure the experimental results align with the original hypothesis
(3) To evaluate the effects of multiple independent variables at once
(4) To simplify the process of collecting subjective observational data
(5) Question not attempted

3. Which logical process involves drawing a general conclusion from specific observations?
(1) Deductive reasoning
(2) Abductive reasoning
(3) Inductive reasoning
(4) Reductionism
(5) Question not attempted

4. What is the fundamental difference between a scientific theory and a scientific law?
(1) A law represents an unproven scientific theory, whereas a theory is a proven fact
(2) A theory is universally accepted by scientists, while a law is subject to debate
(3) There is no fundamental difference; the two terms are often used interchangeably
(4) A law describes what happens, while a theory explains how or why it occurs
(5) Question not attempted

5. Consider the following statements regarding the scientific method:
I. Observation often precedes the formulation of a hypothesis.
II. A valid experiment must be reproducible by other independent scientists.
III. If an experiment contradicts a hypothesis, the data must be discarded.
Which of the above statement(s) is/are correct?
(1) I and II only
(2) II and III only
(3) I and III only
(4) I, II and III
(5) Question not attempted

6. The process of peer review in scientific research is primarily intended to:
(1) Ensure the research generates high profit margins for major academic publishers
(2) Evaluate the overall validity, quality, and originality of papers before publication
(3) Prevent competing scientists from publishing similar experimental results in the field
(4) Standardize the graphical formatting and citation styles across all scientific papers
(5) Question not attempted

7. A variable that is kept constant throughout a scientific experiment is known as a:
(1) Dependent variable
(2) Independent variable
(3) Confounding variable
(4) Control variable
(5) Question not attempted

8. Which of the following steps typically occurs last in the scientific method?
(1) Formulating a hypothesis
(2) Conducting an experiment
(3) Analyzing data
(4) Communicating the results
(5) Question not attempted

NODIA

9. Identify the incorrect statement about scientific models.
(1) They are physical, conceptual, or mathematical representations of real phenomena
(2) They can be used to make predictions about future observations
(3) They are exact replicas of reality with no simplifications
(4) They are subject to revision as new data becomes available
(5) Question not attempted

10. When a researcher manipulates one factor to see its effect on another, the manipulated factor is called the:
(1) Independent variable
(2) Dependent variable
(3) Placebo
(4) Constant
(5) Question not attempted

11. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A): A person sitting in a moving bus falls forward when the bus suddenly stops.
Reason (R): The lower part of the body comes to rest with the bus, while the upper part tends to remain in motion due to inertia.
(1) Both A and R are true and R is the correct explanation of A.
(2) Both A and R are true but R is not the correct explanation of A.
(3) A is true but R is false.
(4) A is false but R is true.
(5) Question not attempted

12. Newton's second law of motion establishes a relationship between which of the following physical quantities?
(1) Mass, velocity, and time
(2) Force, mass, and acceleration
(3) Work, energy, and power
(4) Displacement, velocity, and acceleration
(5) Question not attempted

13. The recoil of a gun after firing a bullet is a practical illustration of:
(1) Newton's first law of motion
(2) Newton's second law of motion
(3) Newton's third law of motion
(4) Law of conservation of energy
(5) Question not attempted

14. Which of the following is defined as the product of the mass of an object and its velocity?
(1) Impulse
(2) Force
(3) Acceleration
(4) Momentum
(5) Question not attempted

15. A satellite moving in a uniform circular orbit around the Earth maintains its path primarily due to:
(1) Centripetal force provided by gravity
(2) Centrifugal force acting on the mass
(3) Magnetic force from the planetary core
(4) Atmospheric friction in low Earth orbit
(5) Question not attempted

16. Match the concepts in List I with the examples in List II.
List I: (Concepts of Motion)
A. Inertia of rest
B. Inertia of motion
C. Third law of motion
D. Conservation of momentum
List II: (Examples/Applications)
i. Swimming in water
ii. Dust falling from a beaten carpet
iii. Rocket propulsion
iv. Athlete running past the finish line
(1) A-ii, B-iv, C-i, D-iii
(2) A-iv, B-ii, C-iii, D-i
(3) A-ii, B-iv, C-iii, D-i
(4) A-i, B-iii, C-ii, D-iv
(5) Question not attempted

17. Which of the following statements about friction is incorrect?
(1) It always acts in the direction opposite to the relative motion
(2) Rolling friction is greater than sliding friction
(3) Sliding friction is generally less than static friction
(4) Friction depends on the nature of the surfaces in contact
(5) Question not attempted

Click Here to Buy book on Amazon

18. Impulse is dimensionally equivalent to which of the following quantities?
(1) Change in momentum
(2) Force
(3) Energy
(4) Acceleration
(5) Question not attempted

19. Identify the correct pair among the following:
(1) Newton's Second Law - Action and Reaction
(2) Newton's Third Law - F = ma
(3) Newton's First Law - Law of Inertia
(4) Universal Gravitation - Law of Moments
(5) Question not attempted

20. Which of the following frames of reference is defined as one in which Newton's first law of motion holds true?
(1) Non-inertial frame
(2) Accelerated frame
(3) Rotational frame
(4) Inertial frame
(5) Question not attempted

21. According to the universal law of gravitation, the force between two objects is inversely proportional to:
(1) The mathematical product of their masses
(2) The linear distance between their surfaces
(3) The square of distance between their centers
(4) The total sum of their individual masses
(5) Question not attempted

22. Consider the following statements about mass and weight:
I. Mass is a scalar quantity, while weight is a vector quantity.
II. The mass of a body remains constant everywhere in the universe.
III. Weight is the gravitational force acting on an object.
IV. A body can have zero mass but non-zero weight in space.
Which of the above statement(s) is/are correct?
(1) I, II and III
(2) II, III and IV
(3) I, III and IV
(4) I, II, III and IV
(5) Question not attempted

23. The acceleration due to gravity (g) on the surface of the Earth is maximum at:
(1) The equator
(2) The center of the Earth
(3) High altitudes above the equator
(4) The poles
(5) Question not attempted

24. When an object undergoes free fall near the Earth's surface (ignoring air resistance), its:
(1) Acceleration remains constant
(2) Velocity remains constant
(3) Acceleration uniformly increases
(4) Mass gradually decreases
(5) Question not attempted

NODIA

25. The minimum initial velocity required for an object to escape the Earth's gravitational pull is approximately:
(1) 9.8 km/s
(2) 11.2 km/s
(3) 29.8 km/s
(4) 300,000 km/s
(5) Question not attempted

26. Who was the first scientist to experimentally determine the value of the universal gravitational constant (G)?
(1) Henry Cavendish
(2) Isaac Newton
(3) Galileo Galilei
(4) Johannes Kepler
(5) Question not attempted

27. Astronauts in low Earth orbit experience "weightlessness" because:
(1) There is no gravity in space
(2) The spacecraft effectively cancels out the Earth's magnetic field
(3) The mass of the objects becomes zero when moving through a vacuum
(4) They are in a constant state of free fall towards the Earth
(5) Question not attempted

28. Consider the following planets:
I. Jupiter
II. Mars
III. Earth
Which of the following represents the correct arrangement of these planets in increasing

order of their surface gravity?
(1) II, III, I
(2) III, II, I
(3) I, III, II
(4) II, I, III
(5) Question not attempted

29. Kepler's second law of planetary motion, the law of equal areas, is a consequence of the conservation of:
(1) Linear momentum
(2) Kinetic energy
(3) Angular momentum
(4) Mass
(5) Question not attempted

30. Which of the following is an exception to the rule that all massive bodies fall at the same rate in a vacuum?
(1) A feather and a coin
(2) A bowling ball and a golf ball
(3) An object dropped horizontally versus vertically
(4) There is no exception; all objects fall at the same rate in a vacuum
(5) Question not attempted

31. Under which of the following conditions is the work done by a force equal to zero?
(1) When the force is perpendicular to the direction of displacement
(2) When the force acts in the direction of displacement
(3) When the force acts opposite to the direction of displacement
(4) When the displacement is uniformly increasing
(5) Question not attempted

32. If the velocity of a moving body is doubled, its kinetic energy becomes:
(1) Half of the original
(2) Double the original
(3) Four times the original
(4) Eight times the original
(5) Question not attempted

33. Which of the following represents the commercial unit of electrical energy?
(1) Joule
(2) Kilowatt-hour
(3) Watt
(4) Electron-volt
(5) Question not attempted

34. Consider the following statements regarding energy transformations:
I. In an electric generator, mechanical energy is converted into electrical energy.
II. In an electric motor, electrical energy is converted into mechanical energy.
III. In a solar cell, solar energy is converted into electrical energy.
IV. In a microphone, electrical energy is converted into sound energy.
V. In a battery, chemical energy is converted into electrical energy.
Which of the above statement(s) is/are incorrect?
(1) I only
(2) III only
(3) IV only
(4) V only
(5) Question not attempted

35. When a simple pendulum swings from its mean position to its extreme position, what happens to its energy?
(1) Kinetic energy is entirely destroyed
(2) Potential energy is converted into kinetic energy
(3) Kinetic energy is converted into potential energy
(4) Both kinetic and potential energy increase simultaneously
(5) Question not attempted

36. One horsepower (hp) is equivalent to approximately how many watts?
(1) 500 W
(2) 746 W
(3) 1000 W
(4) 3600 W
(5) Question not attempted

37. The work done in lifting a 10 kg object to a height of 5 meters (taking $g = 9.8\ m/s^2$) is:
(1) 50 J
(2) 98 J
(3) 490 J
(4) 980 J
(5) Question not attempted

Downloaded from www.pdf.tube

38. The law of conservation of energy states that:
(1) The total energy of an isolated system always increases over time
(2) Energy can only be transformed, not created or destroyed
(3) Energy can only be generated from the conversion of mass
(4) Kinetic energy is always conserved in every type of collision
(5) Question not attempted

39. Match the devices in List I with their corresponding energy conversions in List II.
List I: (Device)
A. Loudspeaker
B. Dynamo
C. Photosynthesis
D. Steam Engine
List II: (Energy Conversion)
i. Light to Chemical
ii. Heat to Mechanical
iii. Electrical to Sound
iv. Mechanical to Electrical
(1) A-iii, B-iv, C-i, D-ii
(2) A-iv, B-iii, C-ii, D-i
(3) A-iii, B-iv, C-ii, D-i
(4) A-i, B-ii, C-iii, D-iv
(5) Question not attempted

40. Work done by kinetic friction on a moving object is always:
(1) Positive
(2) Negative
(3) Zero
(4) Infinite
(5) Question not attempted

41. The primary mechanism of heat transfer in solid metals is:
(1) Convection
(2) Radiation
(3) Conduction
(4) Evaporation
(5) Question not attempted

42. Which mode of heat transfer does not require any material medium?
(1) Radiation
(2) Conduction
(3) Convection
(4) Advection
(5) Question not attempted

43. Absolute zero is mathematically equivalent to which of the following temperatures on the Celsius scale?
(1) 0 degrees Celsius
(2) -100 degrees Celsius
(3) -273.15 degrees Celsius
(4) -373.15 degrees Celsius
(5) Question not attempted

NODIA

44. The anomalous expansion of water occurs between which temperature range?
(1) 0 to 4 degrees Celsius
(2) 4 to 10 degrees Celsius
(3) 90 to 100 degrees Celsius
(4) -4 to 0 degrees Celsius
(5) Question not attempted

45. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A): Water is often used as a coolant in automobile radiators.
Reason (R): Water has a very high specific heat capacity compared to most other liquids.
(1) Both A and R are true and R is the correct explanation of A.
(2) Both A and R are true but R is not the correct explanation of A.
(3) A is true but R is false.
(4) A is false but R is true.
(5) Question not attempted

46. The amount of heat energy required to change 1 kg of a solid into a liquid at atmospheric pressure at its melting point is known as:
(1) Latent heat of vaporization
(2) Specific heat capacity
(3) Thermal capacity
(4) Latent heat of fusion
(5) Question not attempted

47. Sea breezes and land breezes are natural phenomena primarily caused by:
(1) Convection currents in the atmosphere
(2) Conduction of heat in the Earth's crust
(3) Radiative cooling of the ocean
(4) The gravitational pull of the moon
(5) Question not attempted

48. Mercury is commonly used in clinical thermometers because it:
(1) acts as a relatively poor conductor of thermal energy
(2) expands uniformly across a wide temperature range
(3) adheres strongly to the surface of the glass capillary
(4) possesses a density significantly lower than that of water
(5) Question not attempted

49. Which of the following surfaces is the best emitter of thermal radiation?
(1) A highly polished silver mirror
(2) A rough black surface
(3) A smooth white surface
(4) A transparent glass sheet
(5) Question not attempted

50. When salt is added to pure water, its boiling point:
(1) Decreases
(2) Increases
(3) Remains the same
(4) Initially decreases then increases
(5) Question not attempted

51. Consider the following statements about light:
I. Light travels faster in a vacuum than in glass.
II. Refraction occurs when light passes from one medium to another with a different optical density.
III. The angle of incidence is always less than the angle of reflection.
Which of the above statement(s) is/are correct?
(1) I and II only
(2) II and III only
(3) I and III only
(4) I, II and III
(5) Question not attempted

52. The splitting of white light into its component colors upon passing through a prism is called:
(1) Reflection
(2) Refraction
(3) Diffraction
(4) Dispersion
(5) Question not attempted

53. The formation of a mirage in deserts is an optical illusion primarily due to:
(1) Interference of light
(2) Scattering of light
(3) Total internal reflection
(4) Polarization of light
(5) Question not attempted

54. A person suffering from myopia (near-sightedness) is typically prescribed a lens of which type?
(1) Convex lens
(2) Concave lens
(3) Cylindrical lens
(4) Bifocal lens
(5) Question not attempted

55. The blue color of the clear sky is mainly due to the:
(1) Direct reflection of sunlight by the surface of the ocean
(2) Absorption of blue light by the ozone layer in the atmosphere
(3) Dispersion of light by suspended water droplets and aerosols
(4) Scattering of shorter solar wavelengths by air molecules
(5) Question not attempted

56. What type of mirror is commonly used by dentists to examine teeth?
(1) Concave mirror
(2) Convex mirror
(3) Plane mirror
(4) Parabolic mirror
(5) Question not attempted

57. Match the optical phenomena in List I with their corresponding examples in List II.
List I: (Optical Phenomenon)
A. Total Internal Reflection
B. Scattering of light
C. Dispersion of light
D. Refraction of light
List II: (Example/Application)
i. Rainbow formation
ii. Twinkling of stars
iii. Optical fibers
iv. Red color of sun at sunrise
(1) A-iii, B-iv, C-i, D-ii
(2) A-i, B-ii, C-iii, D-iv

Click Here to Buy book on Amazon

(3) A-iii, B-ii, C-i, D-iv
(4) A-iv, B-iii, C-ii, D-i
(5) Question not attempted

58. The power of a lens is measured in:
(1) Diopters
(2) Meters
(3) Watts
(4) Candelas
(5) Question not attempted

59. When light passes from a denser medium to a rarer medium, it bends:
(1) Towards the normal
(2) Away from the normal
(3) It does not bend
(4) Parallel to the boundary
(5) Question not attempted

60. The speed of light in a vacuum is exactly defined as:
(1) 3×10^5 m/s
(2) 299,792,458 m/s
(3) 3×10^{10} m/s
(4) 150,000,000 m/s
(5) Question not attempted

61. Sound waves in air are characterized as:
(1) Transverse electromagnetic waves
(2) Transverse mechanical waves
(3) Longitudinal mechanical waves
(4) Longitudinal electromagnetic waves
(5) Question not attempted

62. The pitch of a sound depends primarily on its:
(1) Amplitude
(2) Speed
(3) Intensity
(4) Frequency
(5) Question not attempted

63. Consider the following statements regarding the speed of sound:
I. It is greater in solids than in liquids.
II. It increases with an increase in the temperature of the medium.
III. It can travel through a perfect vacuum.
IV. It is greater in humid air than in dry air.
Which of the above statement(s) is/are correct?
(1) I, II and IV
(2) I, III and IV
(3) II, III and IV
(4) I and II only
(5) Question not attempted

64. To hear a distinct echo, the minimum distance between the listener and the reflecting surface should be approximately:
(1) 10 meters
(2) 17.2 meters
(3) 34.4 meters
(4) 50 meters
(5) Question not attempted

65. The technique of using high-frequency sound waves to detect objects underwater is called:
(1) RADAR
(2) SONAR
(3) LIDAR
(4) MASER
(5) Question not attempted

66. The normal audible frequency range for an average human ear is:
(1) 2 Hz to 200 Hz
(2) 20 Hz to 20,000 Hz
(3) 200 Hz to 200,000 Hz
(4) 2,000 Hz to 20,000 Hz
(5) Question not attempted

67. The loudness of a sound is directly determined by the wave's:
(1) Wavelength
(2) Frequency
(3) Amplitude
(4) Velocity
(5) Question not attempted

68. Which of the following medical applications utilizes sound waves above the human hearing limit?
(1) Electrocardiogram (ECG)
(2) Magnetic Resonance Imaging (MRI)
(3) X-ray radiography
(4) Ultrasonography
(5) Question not attempted

69. Select the correct sequence of media arranged in increasing order of the speed of sound through them:
(1) Air < Water < Steel
(2) Steel < Water < Air

NODIA

(3) Water < Air < Steel
(4) Air < Steel < Water
(5) Question not attempted

70. The apparent change in frequency of a sound due to the relative motion between the source and the observer is known as:
(1) The Tyndall Effect
(2) The Doppler Effect
(3) The Raman Effect
(4) The Photoelectric Effect
(5) Question not attempted

71. According to Ohm's law, at a constant temperature, the current flowing through a conductor is directly proportional to the:
(1) Resistance of the conductor
(2) Length of the conductor
(3) Cross-sectional area of the conductor
(4) Potential difference across its ends
(5) Question not attempted

72. If three resistors of 2 ohms, 3 ohms, and 5 ohms are connected in series, the equivalent resistance is:
(1) 10 ohms
(2) 0.97 ohms
(3) 1 ohm
(4) 30 ohms
(5) Question not attempted

73. Which of the following instruments is used to measure electric current in a circuit?
(1) Voltmeter
(2) Galvanometer
(3) Ammeter
(4) Potentiometer
(5) Question not attempted

74. An ammeter is always connected in a circuit in:
(1) Series
(2) Parallel
(3) Either series or parallel depending on voltage
(4) A separate external circuit
(5) Question not attempted

75. Consider the following statements about the resistance of a metallic wire:
I. It is directly proportional to its length.
II. It is inversely proportional to its area of cross-section.
III. It depends on the nature of the material.
IV. It remains unaffected by temperature changes.
V. Resistance increases if the wire is stretched.
Which of the above statement(s) is/are incorrect?
(1) II only
(2) III only
(3) IV only
(4) V only
(5) Question not attempted

NODIA

76. The domestic electrical supply in India generally uses Alternating Current (AC) at a frequency of:
(1) 50 Hz
(2) 60 Hz
(3) 100 Hz
(4) 220 Hz
(5) Question not attempted

77. The principle of working of an electric fuse is based on the:
(1) Magnetic effect of current
(2) Chemical effect of current
(3) Heating effect of current
(4) Electromagnetic induction
(5) Question not attempted

78. According to Joule's law of heating, the heat produced in a resistor is proportional to the:
(1) Square of the resistance
(2) Inverse of the time
(3) Inverse of the current
(4) Square of the current
(5) Question not attempted

79. Materials that offer zero electrical resistance at extremely low temperatures are called:
(1) Superconductors
(2) Semiconductors
(3) Insulators
(4) Dielectrics
(5) Question not attempted

80. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A): Silver is not used for making standard electrical transmission wires despite being the best conductor of electricity.
Reason (R): Silver is highly expensive and prone

to theft compared to copper and aluminum.
(1) Both A and R are true and R is the correct explanation of A.
(2) Both A and R are true but R is not the correct explanation of A.
(3) A is true but R is false.
(4) A is false but R is true.
(5) Question not attempted

81. Magnetic field lines outside a permanent bar magnet travel from:
(1) South pole to North pole
(2) North pole to South pole
(3) East to West
(4) The center to the edges
(5) Question not attempted

82. Which rule is used to determine the direction of the magnetic field produced by a current-carrying straight conductor?
(1) Maxwell's Right-Hand Thumb Rule
(2) Fleming's Left-Hand Rule
(3) Fleming's Right-Hand Rule
(4) Lenz's Law
(5) Question not attempted

83. The most suitable material for making the core of an electromagnet is:
(1) Steel
(2) Aluminum
(3) Soft iron
(4) Copper
(5) Question not attempted

84. The phenomenon of generating an electric current in a closed circuit by changing the magnetic field is known as:
(1) Magnetic saturation
(2) Electromotive resonance
(3) Thermoelectric effect
(4) Electromagnetic induction
(5) Question not attempted

85. An electric motor works on the principle that:
(1) A changing magnetic field induces a voltage across a circuit
(2) Heat is generated when electric current flows through a resistor
(3) Current-carrying conductors in magnetic fields experience force
(4) Magnetic poles of the same polarity naturally attract each other
(5) Question not attempted

86. Match the laws and rules in List I with their corresponding applications or concepts in List II.
List I: (Law/Rule)
A. Fleming's Left-Hand Rule
B. Fleming's Right-Hand Rule
C. Lenz's Law
D. Faraday's Law
List II: (Application/Concept)
i. Magnitude of induced EMF
ii. Direction of induced current in generators
iii. Direction of force on a conductor in motors
iv. Conservation of energy in induction
(1) A-iii, B-ii, C-iv, D-i
(2) A-ii, B-iii, C-i, D-iv
(3) A-iii, B-iv, C-ii, D-i
(4) A-i, B-ii, C-iii, D-iv
(5) Question not attempted

87. Who discovered the phenomenon of electromagnetic induction?
(1) Hans Christian Oersted
(2) Nikola Tesla
(3) Andre-Marie Ampere
(4) Michael Faraday
(5) Question not attempted

88. Materials like iron, nickel, and cobalt that are strongly attracted by magnets are classified as:
(1) Ferromagnetic
(2) Paramagnetic
(3) Diamagnetic
(4) Non-magnetic
(5) Question not attempted

89. A device that reverses the direction of current in a circuit periodically is called a:
(1) Transformer
(2) Rheostat
(3) Commutator
(4) Capacitor
(5) Question not attempted

90. Which of the following best describes the Earth's magnetic north pole?
(1) It behaves magnetically like the south pole of a bar magnet.
(2) It is exactly aligned with the geographic

Downloaded from www.pdf.tube

North Pole.
(3) It is located near the equator.
(4) It repels the north pole of a compass needle.
(5) Question not attempted

91. The nucleus of an atom consists of which of the following subatomic particles?
(1) Protons and electrons
(2) Neutrons and electrons
(3) Protons, neutrons, and electrons
(4) Protons and neutrons
(5) Question not attempted

92. Consider the following statements regarding the electron:
I. It has a negative electrical charge.
II. Its mass is approximately 1/1836 that of a proton.
III. It resides strictly within the nucleus of an atom.
Which of the above statement(s) is/are correct?
(1) I and II only
(2) I and III only
(3) II and III only
(4) I, II and III
(5) Question not attempted

93. The atomic number of an element represents the total number of:
(1) Neutrons in its nucleus
(2) Nucleons in its nucleus
(3) Protons in its nucleus
(4) Valence electrons in its outer shell
(5) Question not attempted

94. Atoms of the same element that have the same atomic number but different mass numbers are called:
(1) Isobars
(2) Isotones
(3) Isomers
(4) Isotopes
(5) Question not attempted

95. Isobars are atoms of different elements that possess:
(1) The same mass number but different atomic numbers
(2) The same atomic number but different mass numbers
(3) The same number of neutrons
(4) Identical chemical properties
(5) Question not attempted

96. Which scientist proposed the planetary model of the atom, where electrons revolve in discrete circular orbits around the nucleus?
(1) J.J. Thomson
(2) Niels Bohr
(3) Ernest Rutherford
(4) John Dalton
(5) Question not attempted

97. Ernest Rutherford's gold foil experiment led to the discovery of the:
(1) Electron
(2) Atomic nucleus
(3) Proton
(4) Neutron
(5) Question not attempted

98. Arrange the following atomic models in chronological order of their proposal:
I. Bohr's model
II. Dalton's solid sphere model
III. Thomson's plum pudding model
IV. Rutherford's nuclear model
Which of the following is the correct order?
(1) II, III, IV, I
(2) III, II, IV, I
(3) II, IV, III, I
(4) I, II, III, IV
(5) Question not attempted

99. The combining capacity of an element with other elements is fundamentally determined by its:
(1) Number of neutrons
(2) Core electrons
(3) Valency
(4) Atomic mass
(5) Question not attempted

100. In the modern periodic table, elements are arranged in increasing order of their:
(1) Atomic mass
(2) Number of neutrons
(3) Isotopic weight
(4) Atomic number
(5) Question not attempted

101. An ionic bond is formed by the:

NODIA

(1) Mutual sharing of electrons between two atoms
(2) Sharing of an electron pair provided entirely by one atom
(3) Complete transfer of one or more electrons from one atom to another
(4) Overlapping of atomic nuclei
(5) Question not attempted

102. Which of the following compounds exhibits covalent bonding?
(1) Sodium chloride (NaCl)
(2) Water (H_2O)
(3) Magnesium oxide (MgO)
(4) Calcium fluoride (CaF_2)
(5) Question not attempted

103. Metallic bonds are generally characterized by a lattice of positive ions surrounded by a "sea" of:
(1) Positively charged protons
(2) Fixed neutral neutrons
(3) Negatively charged anions
(4) Delocalized valence electrons
(5) Question not attempted

104. Consider the following properties of ionic compounds:
I. They generally have high melting and boiling points.
II. They conduct electricity in the solid state.
III. They conduct electricity when dissolved in water.
IV. They are typically soluble in non-polar solvents like benzene.
Which of the above statement(s) is/are correct?
(1) I and III only
(2) II and IV only
(3) I, II and III
(4) I and IV only
(5) Question not attempted

105. Covalent compounds generally have low melting and boiling points because:
(1) The strong covalent bonds between atoms are easily broken
(2) They possess a highly stable crystalline lattice arrangement
(3) Intermolecular forces between molecules are relatively weak
(4) They contain a high concentration of freely moving electrons
(5) Question not attempted

106. The exceptionally high boiling point of water relative to other similar sized molecules is primarily due to:
(1) Hydrogen bonding
(2) Ionic bonding
(3) Coordinate covalent bonding
(4) London dispersion forces
(5) Question not attempted

107. A coordinate covalent (dative) bond is one in which:
(1) Electrons are shared equally by two atoms
(2) An electron is permanently transferred
(3) Metallic ions overlap their d-orbitals
(4) One atom donates both electrons to the shared pair
(5) Question not attempted

108. Electronegativity is defined as the tendency of an atom to:
(1) Lose valence electrons and form positively charged cations
(2) Attract a shared electron pair in a covalent bond
(3) Repel surrounding atoms within a rigid crystalline lattice
(4) Undergo spontaneous radioactive decay of the atomic nucleus
(5) Question not attempted

109. Which of the following molecules has a nonpolar covalent bond?
(1) HCl
(2) H_2O
(3) N_2
(4) NH_3
(5) Question not attempted

110. Match the substances in List I with their dominant bond type in List II.
List I: (Substance)
A. Potassium Chloride (KCl)
B. Methane (CH_4)
C. Copper wire (Cu)
D. Ammonium ion (NH_4^+)
List II: (Dominant Bond Type)
i. Metallic bond
ii. Ionic bond
iii. Coordinate bond (includes)

Click Here to Buy book on Amazon

iv. Covalent bond
(1) A-ii, B-iv, C-i, D-iii
(2) A-ii, B-i, C-iv, D-iii
(3) A-iv, B-ii, C-iii, D-i
(4) A-i, B-iii, C-ii, D-iv
(5) Question not attempted

111. The pH scale is a measure of the concentration of which ions in a solution?
(1) Hydrogen ions (H^+)
(2) Hydroxide ions (OH^-)
(3) Chloride ions (Cl^-)
(4) Sodium ions (Na+)
(5) Question not attempted

112. A solution turns blue litmus paper red. Its pH is most likely to be:
(1) 7
(2) 9
(3) 12
(4) 3
(5) Question not attempted

113. A strong acid is characterized by its ability to:
(1) Partially dissociate in water
(2) Completely dissociate into ions in water
(3) Turn phenolphthalein pink
(4) React violently with all noble gases
(5) Question not attempted

114. The reaction between an acid and a base to produce salt and water is known as:
(1) Neutralization
(2) Esterification
(3) Oxidation
(4) Saponification
(5) Question not attempted

115. Milk of magnesia, commonly used as an antacid, is chemically:
(1) Calcium carbonate
(2) Sodium bicarbonate
(3) Magnesium hydroxide
(4) Aluminum chloride
(5) Question not attempted

116. Consider the following common salts and their chemical names:
I. Baking soda - Sodium bicarbonate
II. Washing soda - Sodium carbonate decahydrate
III. Plaster of Paris - Calcium sulfate hemihydrate
IV. Bleaching powder - Calcium oxychloride
V. Table salt - Potassium chloride
Which of the above pair(s) is/are incorrectly matched?
(1) I only
(2) III only
(3) IV only
(4) V only
(5) Question not attempted

NODIA

117. Which acid is naturally present in sour milk or curd?
(1) Citric acid
(2) Tartaric acid
(3) Lactic acid
(4) Oxalic acid
(5) Question not attempted

118. The sting of ants and bees contains which of the following acids, causing pain and irritation?
(1) Acetic acid
(2) Formic (Methanoic) acid
(3) Sulfuric acid
(4) Ascorbic acid
(5) Question not attempted

119. Rainwater is typically considered “acid rain” when its pH drops below approximately:
(1) 7.0
(2) 6.5
(3) 5.6
(4) 8.2
(5) Question not attempted

120. Which of the following salts is formed when a strong acid reacts with a weak base?
(1) Neutral salt
(2) Basic salt
(3) Acidic salt
(4) Amphoteric salt
(5) Question not attempted

121. The unique ability of carbon atoms to form long chains or rings by bonding with each other is known as:
(1) Isomerism
(2) Polymerization
(3) Catenation
(4) Tetravalency

(5) Question not attempted

122. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A): Graphite is a good conductor of electricity, whereas diamond is not.
Reason (R): In graphite, each carbon atom has one free, delocalized electron, whereas in diamond, all four valence electrons are used in covalent bonding.
(1) Both A and R are true and R is the correct explanation of A.
(2) Both A and R are true but R is not the correct explanation of A.
(3) A is true but R is false.
(4) A is false but R is true.
(5) Question not attempted

123. Buckminsterfullerene is an allotropic form of carbon containing how many carbon atoms in its spherical molecule?
(1) 40
(2) 50
(3) 60
(4) 70
(5) Question not attempted

124. Hydrocarbons that contain at least one carbon-carbon double or triple bond are classified as:
(1) Saturated hydrocarbons
(2) Unsaturated hydrocarbons
(3) Aromatic hydrocarbons only
(4) Alicyclic hydrocarbons
(5) Question not attempted

125. A series of organic compounds that have the same functional group and similar chemical properties, differing by a $-CH_2$ unit, is called a:
(1) Heterogeneous series
(2) Isomeric series
(3) Homologous series
(4) Polymer series
(5) Question not attempted

126. Compounds with the same molecular formula but different structural formulas are known as:
(1) Isotopes
(2) Isobars
(3) Allotropes
(4) Isomers
(5) Question not attempted

127. The functional group -COOH is characteristic of which class of organic compounds?
(1) Carboxylic acids
(2) Alcohols
(3) Aldehydes
(4) Ketones
(5) Question not attempted

128. Match the functional groups in List I with the suffixes used in IUPAC naming in List II.
List I: (Functional Group)
A. Alcohol (-OH)
B. Aldehyde (-CHO)
C. Ketone (-CO-)
D. Carboxylic acid (-COOH)
List II: (Suffix used in IUPAC naming)
i. -oic acid
ii. -one
iii. -al
iv. -ol
(1) A-iv, B-iii, C-ii, D-i
(2) A-iv, B-ii, C-iii, D-i
(3) A-iii, B-iv, C-ii, D-i
(4) A-i, B-ii, C-iii, D-iv
(5) Question not attempted

129. The chemical process of making soap by heating animal fats or vegetable oils with a strong base is called:
(1) Esterification
(2) Saponification
(3) Hydrogenation
(4) Fermentation
(5) Question not attempted

130. The main constituent of biogas (gobar gas) and natural gas is:
(1) Methane
(2) Butane
(3) Ethane
(4) Propane
(5) Question not attempted

131. The property of metals by which they can be beaten into thin sheets is known as:
(1) Ductility
(2) Sonority
(3) Malleability
(4) Conductivity

Downloaded from www.pdf.tube

(5) Question not attempted

132. Which of the following metals exists as a liquid at room temperature?
(1) Gallium
(2) Cesium
(3) Francium
(4) Mercury
(5) Question not attempted

133. Identify the only non-metal that exists as a liquid at room temperature.
(1) Iodine
(2) Chlorine
(3) Bromine
(4) Phosphorus
(5) Question not attempted

134. Consider the following statements about the reactivity series of metals:
I. Metals at the top of the series can displace metals below them from their salt solutions.
II. Gold and platinum are placed at the bottom of the series.
III. Metals below hydrogen in the series can easily liberate hydrogen gas from dilute acids.
Which of the above statement(s) is/are correct?
(1) I and II only
(2) II and III only
(3) I and III only
(4) I, II and III
(5) Question not attempted

135. Metal oxides that exhibit both acidic and basic behaviors are known as:
(1) Neutral oxides
(2) Peroxides
(3) Superoxides
(4) Amphoteric oxides
(5) Question not attempted

136. The process of heating carbonate ores strongly in limited air to convert them into oxides is termed:
(1) Calcination
(2) Roasting
(3) Smelting
(4) Refining
(5) Question not attempted

137. Anodizing is a process of forming a thick oxide layer to prevent corrosion on which of the following metals?
(1) Iron
(2) Copper
(3) Aluminum
(4) Silver
(5) Question not attempted

138. Galvanization is a method of protecting steel and iron from rusting by coating them with a thin layer of:
(1) Zinc
(2) Tin
(3) Chromium
(4) Nickel
(5) Question not attempted

NODIA

139. The most abundant metal in the Earth's crust by weight is:
(1) Iron
(2) Calcium
(3) Sodium
(4) Aluminum
(5) Question not attempted

140. Arrange the following metals in decreasing order of their chemical reactivity:
I. Calcium
II. Potassium
III. Magnesium
IV. Sodium
Which of the following is the correct order?
(1) II, IV, I, III
(2) IV, II, I, III
(3) II, I, IV, III
(4) I, II, III, IV
(5) Question not attempted

141. Who is credited with the first discovery and naming of the "cell" in 1665?
(1) Antonie van Leeuwenhoek
(2) Matthias Schleiden
(3) Robert Hooke
(4) Theodor Schwann
(5) Question not attempted

142. Which of the following is not a postulate of the classical Cell Theory?
(1) All living organisms are composed of one or more cells

(2) The cell is the basic structural and functional unit of life
(3) All cells arise from pre-existing cells
(4) All cells contain a true nucleus and membrane-bound organelles
(5) Question not attempted

143. The primary distinguishing feature of a prokaryotic cell compared to a eukaryotic cell is the absence of:
(1) A distinct, membrane-bound nucleus
(2) A flexible phospholipid bilayer
(3) Protein-synthesizing ribosomes
(4) Double-stranded genetic material
(5) Question not attempted

144. Which of the following structures is found in plant cells but strictly absent in animal cells?
(1) Mitochondria
(2) Cell wall
(3) Golgi apparatus
(4) Endoplasmic reticulum
(5) Question not attempted

145. Mitochondria are often referred to as the "powerhouses" of the cell because they:
(1) Synthesize proteins
(2) Generate cellular energy in the form of ATP
(3) Perform photosynthesis
(4) Digest foreign cellular materials
(5) Question not attempted

146. Consider the following cellular organelles and their functions:
I. Lysosomes - Intracellular digestion (suicide bags)
II. Ribosomes - Protein synthesis
III. Chloroplasts - Lipid synthesis
IV. Vacuoles - Storage of substances
Which of the above pair(s) is/are correctly matched?
(1) I, II and IV
(2) I, III and IV
(3) II, III and IV
(4) I, II, III and IV
(5) Question not attempted

147. The primary function of the Golgi apparatus in a eukaryotic cell is:
(1) Generation of cellular ATP through oxidation
(2) Rapid synthesis of messenger RNA within the nucleus
(3) Modification, sorting, and packaging of proteins
(4) Enzymatic breakdown of various toxic substances
(5) Question not attempted

148. Rough Endoplasmic Reticulum (RER) appears "rough" under a microscope due to the presence of which attached structures?
(1) Lysosomes
(2) Centrioles
(3) Peroxisomes
(4) Ribosomes
(5) Question not attempted

149. Chromoplasts are a type of plastid primarily responsible for:
(1) Storing starch in roots
(2) Carrying out the light reactions of photosynthesis
(3) Imparting colors other than green to flowers and fruits
(4) Breaking down cellular waste
(5) Question not attempted

150. The currently accepted model describing the structure of the cell membrane is known as the:
(1) Unit membrane model
(2) Fluid mosaic model
(3) Sandwich model
(4) Bilayer solid model
(5) Question not attempted

151. The primary role of chlorophyll in photosynthesis is to:
(1) Absorb carbon dioxide from the air
(2) Convert oxygen into glucose
(3) Transport water from roots to leaves
(4) Absorb light energy
(5) Question not attempted

152. Match the processes in List I with their site of occurrence in the cell in List II.
List I: (Process/Stage)
A. Glycolysis
B. Krebs Cycle (Citric Acid Cycle)
C. Light reaction of photosynthesis
D. Dark reaction (Calvin cycle)
List II: (Site of occurrence in the cell)

Click Here to Buy book on Amazon

i. Mitochondrial matrix
ii. Cytoplasm
iii. Stroma of chloroplast
iv. Thylakoids of chloroplast
(1) A-ii, B-i, C-iv, D-iii
(2) A-i, B-ii, C-iii, D-iv
(3) A-ii, B-i, C-iii, D-iv
(4) A-iv, B-iii, C-ii, D-i
(5) Question not attempted

153. During the light-dependent reactions of photosynthesis, oxygen gas is released as a byproduct of:
(1) The fixation of carbon dioxide gas
(2) The enzymatic breakdown of glucose
(3) The photolysis of water molecules
(4) The chemical synthesis of ATP
(5) Question not attempted

154. Tiny pores on the surface of plant leaves that facilitate gas exchange are called:
(1) Stomata
(2) Lenticels
(3) Hydathodes
(4) Trichomes
(5) Question not attempted

155. Aerobic respiration differs from anaerobic respiration in that it:
(1) Produces less ATP per glucose molecule
(2) Results in the production of lactic acid or ethanol
(3) Occurs entirely within the cytoplasm
(4) Strictly requires the presence of oxygen
(5) Question not attempted

156. The universal energy currency molecule generated during cellular respiration is:
(1) DNA
(2) ATP (Adenosine Triphosphate)
(3) RNA
(4) NADP
(5) Question not attempted

157. Which of the following processes is common to both aerobic and anaerobic respiration?
(1) Krebs cycle
(2) Electron transport chain
(3) Glycolysis
(4) Oxidative phosphorylation
(5) Question not attempted

158. Consider the following factors affecting the rate of photosynthesis:
I. Light intensity
II. Carbon dioxide concentration
III. Temperature
IV. Availability of water
V. Atmospheric nitrogen concentration
Which of the above statement(s) identify the primary limiting factors for photosynthesis?
(1) I, II, III and IV
(2) I, III, IV and V
(3) II, III, IV and V
(4) I, II, IV and V
(5) Question not attempted

159. Muscle cramps in human bodies during heavy exercise are caused by the accumulation of:
(1) Lactic acid
(2) Ethanol
(3) Pyruvic acid
(4) Carbon dioxide
(5) Question not attempted

160. The Respiratory Quotient (R.Q.) is defined as the ratio of:
(1) Oxygen consumed to carbon dioxide evolved
(2) Carbon dioxide evolved to oxygen consumed
(3) Water produced to oxygen consumed
(4) ATP produced to glucose consumed
(5) Question not attempted

161. Organisms that synthesize their own food from simple inorganic substances using light or chemical energy are called:
(1) Heterotrophs
(2) Autotrophs
(3) Saprotrophs
(4) Parasites
(5) Question not attempted

162. Human beings ingest complex solid organic food which is then digested and absorbed. This type of nutrition is termed:
(1) Holozoic
(2) Saprophytic
(3) Parasitic
(4) Symbiotic
(5) Question not attempted

163. Cuscuta (Amarbel) is an example of which type of plant nutrition?

Downloaded from www.pdf.tube

(1) Autotrophic
(2) Insectivorous
(3) Parasitic
(4) Saprophytic
(5) Question not attempted

164. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A): The inner lining of the human stomach is protected from the action of hydrochloric acid (HCl).
Reason (R): The stomach secretes mucus that coats the inner lining, preventing acid damage.
(1) Both A and R are true and R is the correct explanation of A.
(2) Both A and R are true but R is not the correct explanation of A.
(3) A is true but R is false.
(4) A is false but R is true.
(5) Question not attempted

165. The primary role of bile juice in digestion is to:
(1) Digest proteins into amino acids
(2) Create an acidic environment in the small intestine
(3) Emulsify large fat globules into smaller micelles
(4) Breakdown starch into simple sugars
(5) Question not attempted

166. Finger-like projections in the small intestine that significantly increase the surface area for absorption are known as:
(1) Cilia
(2) Villi
(3) Flagella
(4) Alveoli
(5) Question not attempted

167. Which of the following vitamins is water-soluble and must be consumed regularly in the diet?
(1) Vitamin A
(2) Vitamin D
(3) Vitamin K
(4) Vitamin C
(5) Question not attempted

168. A diet deficient in Vitamin A is most likely to cause which of the following conditions?
(1) Night blindness
(2) Scurvy
(3) Rickets
(4) Beriberi
(5) Question not attempted

169. Kwashiorkor, a form of severe malnutrition, is primarily caused by a deficiency of:
(1) Carbohydrates
(2) Fats
(3) Proteins
(4) Minerals
(5) Question not attempted

NODIA

170. Match the vitamins and minerals in List I with their corresponding deficiency diseases in List II.
List I: (Vitamin)
A. Vitamin B1 (Thiamine)
B. Vitamin C (Ascorbic acid)
C. Vitamin D (Calciferol)
D. Iron (Mineral)
List II: (Deficiency Disease)
i. Scurvy
ii. Anemia
iii. Rickets
iv. Beriberi
(1) A-iv, B-i, C-iii, D-ii
(2) A-i, B-iv, C-ii, D-iii
(3) A-iv, B-iii, C-i, D-ii
(4) A-iii, B-i, C-iv, D-ii
(5) Question not attempted

171. Bakelite and melamine are examples of which type of polymer?
(1) Thermoplastics
(2) Elastomers
(3) Natural fibers
(4) Thermosetting plastics
(5) Question not attempted

172. The process of heating natural rubber with sulfur to improve its strength and elasticity is called:
(1) Polymerization
(2) Vulcanization
(3) Galvanization
(4) Saponification
(5) Question not attempted

173. Which of the following synthetic fibers is often referred to as "artificial silk" because it is regenerated from natural cellulose?
(1) Nylon
(2) Polyester
(3) Rayon
(4) Acrylic
(5) Question not attempted

174. Brass is an alloy primarily composed of which two metals?
(1) Copper and Tin
(2) Iron and Carbon
(3) Lead and Tin
(4) Copper and Zinc
(5) Question not attempted

175. Bronze is a historically significant alloy made mostly of:
(1) Copper and Tin
(2) Copper and Zinc
(3) Iron and Chromium
(4) Aluminum and Magnesium
(5) Question not attempted

176. Select the correct sequence of the following fibers arranged in increasing order of their typical tensile strength:
(1) Cotton < Wool < Nylon
(2) Wool < Cotton < Nylon
(3) Nylon < Cotton < Wool
(4) Wool < Nylon < Cotton
(5) Question not attempted

177. Kevlar, a high-strength synthetic polymer, is best known for its use in:
(1) Non-stick cookware coatings
(2) Bulletproof vests and body armor
(3) Biodegradable packaging
(4) Artificial flavorings
(5) Question not attempted

178. Fiberglass is an example of a composite material where glass fibers are embedded in a:
(1) Polymer or plastic matrix
(2) Metallic alloy matrix
(3) Crystalline ceramic matrix
(4) Structural concrete matrix
(5) Question not attempted

179. The principal raw material used in the manufacture of ordinary glass is:
(1) Calcium carbonate
(2) Sodium chloride
(3) Silica (sand)
(4) Alumina
(5) Question not attempted

180. The most abundant chemical compound in Portland cement is:
(1) Silica (SiO_2)
(2) Alumina (Al_2O_3)
(3) Iron oxide (Fe_2O_3)
(4) Calcium oxide (CaO)
(5) Question not attempted

181. Why are synthetic detergents generally preferred over traditional soaps for washing clothes in hard water?
(1) They are much cheaper to produce
(2) They are 100% naturally derived
(3) They do not form scum in hard water
(4) They bleach the clothes automatically
(5) Question not attempted

182. Consider the following statements about bleaching powder (Calcium oxychloride):
I. It is produced by the action of chlorine gas on dry slaked lime.
II. It is used for disinfecting drinking water.
III. It releases oxygen gas when left open in the air.
Which of the above statement(s) is/are correct?
(1) I and II only
(2) II and III only
(3) I and III only
(4) I, II and III
(5) Question not attempted

183. Which of the following chemicals is commonly used as a commercial food preservative for fruit juices and jams?
(1) Sodium bicarbonate
(2) Calcium sulfate
(3) Magnesium hydroxide
(4) Sodium benzoate
(5) Question not attempted

184. Saccharin and aspartame are primarily used in the food industry as:
(1) Artificial sweetening agents

Click Here to Buy book on Amazon

(2) Food colors
(3) Emulsifiers
(4) Antioxidants
(5) Question not attempted

185. Monosodium glutamate (MSG) is added to packaged foods primarily to:
(1) Extend shelf life
(2) Prevent oxidation
(3) Enhance flavor
(4) Add nutritional value
(5) Question not attempted

186. Chemicals applied to living tissues to kill or prevent the growth of microbes are called:
(1) Antiseptics
(2) Disinfectants
(3) Antibiotics
(4) Analgesics
(5) Question not attempted

187. Toothpastes are generally formulated to be slightly basic in nature. What is the primary chemical reason for this?
(1) To dissolve the calcium phosphate of tooth enamel
(2) To produce a foaming action with water
(3) To bleach the teeth to a white color
(4) To neutralize the acids produced by bacteria in the mouth
(5) Question not attempted

188. Consider the following common agricultural fertilizers:
I. Urea
II. Superphosphate
III. Potassium chloride (Muriate of potash)
IV. Sodium chloride
Which of the above identify primary NPK (Nitrogen, Phosphorus, Potassium) fertilizers?
(1) I, II and III only
(2) I, III and IV only
(3) II, III and IV only
(4) I, II, III and IV
(5) Question not attempted

189. DDT (Dichloro-diphenyl-trichloroethane) was widely used globally as an:
(1) Herbicide
(2) Fungicide
(3) Insecticide
(4) Artificial fertilizer
(5) Question not attempted

190. Most commercial liquid drain cleaners are highly caustic and rely on which strong base to dissolve clogs?
(1) Calcium carbonate
(2) Ammonium nitrate
(3) Magnesium sulfate
(4) Sodium hydroxide
(5) Question not attempted

191. The mechanical advantage of a simple machine is defined as the ratio of:
(1) Load force to effort force
(2) Effort force to load force
(3) Distance moved by effort to distance moved by load
(4) Input work to output work
(5) Question not attempted

192. A pair of scissors is an example of a:
(1) Class 2 lever
(2) Class 1 lever
(3) Class 3 lever
(4) Wheel and axle
(5) Question not attempted

NODIA

193. In a Class 2 lever, such as a wheelbarrow or a nutcracker, the positions are arranged as:
(1) Fulcrum is between the Load and the Effort
(2) Load is between the Fulcrum and the Effort
(3) Effort is between the Fulcrum and the Load
(4) Fulcrum, Load, and Effort act at the same point
(5) Question not attempted

194. Consider the following statements about simple machines:
I. They can multiply force.
II. They can multiply speed or distance.
III. They can change the direction of an applied force.
IV. They can multiply work, outputting more energy than is put in.
V. An inclined plane is a type of simple machine.
Which of the above statement(s) is/are incorrect?
(1) I only
(2) II only
(3) IV only

(4) V only
(5) Question not attempted

195. In a Class 3 lever, the mechanical advantage is always:
(1) Greater than 1
(2) Less than 1
(3) Exactly 1
(4) Infinite
(5) Question not attempted

196. A single fixed pulley offers a mechanical advantage of approximately 1. What is its primary practical purpose?
(1) To significantly reduce the effort required to lift a load
(2) To multiply the speed of the load
(3) To increase the total amount of work done
(4) To change the direction of the applied effort
(5) Question not attempted

197. Match the simple machines in List I with their corresponding everyday examples in List II.
List I: (Simple Machine)
A. Inclined plane
B. Wedge
C. Screw
D. Wheel and axle
List II: (Everyday Example)
i. Axe blade
ii. Doorknob
iii. Wheelchair ramp
iv. Spiral staircase
(1) A-iii, B-i, C-iv, D-ii
(2) A-i, B-iii, C-ii, D-iv
(3) A-iii, B-iv, C-i, D-ii
(4) A-iv, B-ii, C-iii, D-i
(5) Question not attempted

198. A screw can be fundamentally described as which type of simple machine wrapped around a central cylinder?
(1) A lever
(2) An inclined plane
(3) A pulley
(4) A wedge
(5) Question not attempted

199. The efficiency of a practical simple machine is always less than 100% primarily due to:
(1) The conservation of mass
(2) The creation of new energy
(3) The mechanical advantage being too high
(4) Friction between moving parts
(5) Question not attempted

200. Match the machine terms in List I with their corresponding definitions in List II.
List I: (Machine Term)
A. Fulcrum
B. Load
C. Effort
D. Velocity Ratio
List II: (Definition)
i. The fixed point around which a lever pivots
ii. The resistance force to be overcome
iii. The force applied to the machine
iv. Ratio of distance moved by effort to distance moved by load
(1) A-i, B-ii, C-iii, D-iv
(2) A-ii, B-i, C-iv, D-iii
(3) A-i, B-iii, C-ii, D-iv
(4) A-iv, B-iii, C-ii, D-i
(5) Question not attempted

www.nodia.in

Downloaded from www.pdf.tube

ANSWERS

1. (2) A tentative, testable explanation for an observed phenomenon
A hypothesis serves as an initial, testable proposal within scientific inquiry. It offers a potential explanation for a specific observation that researchers can verify through systematic experimentation. Unlike a law or a theory, it is not yet proven but provides a necessary framework for collecting data and conducting rigorous analysis to support or refute the initial claim made.

2. (1) To provide a standard baseline for comparison with the test group
The control group acts as a vital reference point in scientific research. By remaining unexposed to the experimental variable, it allows investigators to measure the exact influence of the independent variable on the test group. This comparison ensures that observed changes result from the specific manipulation rather than external environmental factors or chance occurrences within the study environment.

3. (3) Inductive reasoning
Inductive reasoning involves synthesizing specific instances to form a broad generalization. This logical approach observes patterns in data to derive probable conclusions about larger populations or universal principles. While the resulting conclusions are not guaranteed to be true, they provide essential predictive models that guide further scientific exploration and help in establishing broader theories based on recorded evidence.

4. (4) A law describes what happens, while a theory explains how or why it occurs
Scientific laws provide concise descriptions of natural phenomena, often expressed mathematically, to state what happens under specific conditions. Conversely, scientific theories offer comprehensive, evidence-based explanations of how or why these phenomena occur. While laws summarize observations, theories integrate multiple hypotheses and laws to provide a deeper understanding of the underlying mechanisms driving the natural world and its processes.

5. (1) I and II only
Effective scientific methodology typically starts with careful observation, which then informs the development of a testable hypothesis. For results to gain credibility, the experimental process must be reproducible by others to confirm accuracy. If data contradicts the hypothesis, researchers must refine or replace the hypothesis rather than discard the data, as unexpected results are critical for scientific advancement.

6. (2) Evaluate the overall validity, quality, and originality of papers before publication
Peer review serves as a rigorous quality control mechanism in academic publishing. Independent experts in the same field critically evaluate a researcher's methodology, data interpretation, and original contributions. This scrutiny ensures that only studies with high technical accuracy and logical consistency are published, thereby maintaining the integrity of the scientific record and preventing the spread of flawed or erroneous information.

7. (4) Control variable
Control variables are external factors purposefully kept unchanged throughout an experiment to ensure a fair test. By neutralizing these potential influences, researchers can confidently attribute any observed changes in the dependent variable solely to the manipulation of the independent variable. Maintaining constant conditions is essential for isolating specific cause-and-effect relationships and enhancing the overall validity and reliability of experimental results.

8. (4) Communicating the results
Sharing findings with the scientific community represents the concluding stage of the scientific method. This process involves publishing research in peer-reviewed journals or presenting at conferences, allowing other scientists to evaluate, replicate, and build upon the work. Transparent communication is vital for collective

NODIA

knowledge advancement, as it subjects findings to public scrutiny and enables the integration of new data into existing knowledge.

9. (3) They are exact replicas of reality with no simplifications
Scientific models are simplified representations used to understand complex systems or predict future behaviors. They can be physical, mathematical, or conceptual tools that highlight essential features while ignoring irrelevant details. Because they are approximations, they are not exact replicas of reality. Models are dynamic and undergo constant revision or replacement as more accurate data and sophisticated technological observations become available.

10. (1) Independent variable
The independent variable is the specific factor that a researcher changes or controls to observe its effects. It acts as the hypothesized cause within an experiment. By systematically varying this factor while keeping others constant, scientists can measure how it influences the outcome, known as the dependent variable. This manipulation is fundamental to establishing clear relationships and understanding how different elements interact.

11. (1) Both A and R are true and R is the correct explanation of A.
Inertia causes an object to resist changes in its state of motion. When a bus stops suddenly, friction between the seat and the passenger's lower body brings it to rest. However, the upper body continues moving forward at the previous speed due to its inherent inertia. This physical tendency explains why a person falls forward when the vehicle's momentum is abruptly halted.

12. (2) Force, mass, and acceleration
Newton's second law of motion quantifies how the motion of an object changes when an external force is applied. It establishes that the net force acting on a body is directly proportional to its mass and the resulting acceleration. This fundamental relationship is often expressed as force equals mass times acceleration, providing a critical framework for calculating the dynamics of physical systems.

13. (3) Newton's third law of motion
Newton's third law states that for every action, there is an equal and opposite reaction. When a gun fires a bullet, it exerts a forward force on the projectile. Simultaneously, the bullet exerts an equal backward force on the gun. This reaction force causes the firearm to kick back or recoil, demonstrating the reciprocal nature of forces between interacting physical bodies.

14. (4) Momentum
Momentum is a vector quantity that represents the quantity of motion an object possesses. It is calculated by multiplying the object's mass by its velocity. Larger masses or higher speeds result in greater momentum, making the object harder to stop. This concept is fundamental in physics for analyzing collisions and understanding how forces change the motion of objects over specific time intervals.

15. (1) Centripetal force provided by gravity
A satellite remains in orbit because the Earth's gravitational pull acts as a centripetal force. This force constantly pulls the satellite toward the center of the planet, changing its direction without altering its speed. This continuous inward acceleration balances the satellite's tangential velocity, resulting in a stable circular path that prevents it from flying off into space or crashing.

16. (1) A-ii, B-iv, C-i, D-iii
Inertia of rest is seen when dust falls from a carpet being beaten. Inertia of motion explains why athletes cannot stop immediately at the finish line. Swimming demonstrates the third law of motion through action-reaction forces in water. Rocket propulsion relies on the conservation of momentum as exhaust gases are ejected. These examples illustrate fundamental physical principles governing moving objects.

17. (2) Rolling friction is greater than sliding friction
Friction is a force that opposes relative motion between surfaces in contact. While sliding friction occurs when one surface moves over another, rolling friction occurs when an object rolls. Rolling friction is significantly lower than sliding friction, which is why wheels move heavy loads efficiently. Additionally, sliding friction is

Click Here to Buy book on Amazon

generally less than the static friction required to initiate movement from rest.

18. (1) Change in momentum
Impulse is defined as the product of the average force applied to an object and the time interval during which it acts. According to the impulse-momentum theorem, this quantity is equal to the change in the object's momentum. Therefore, both impulse and momentum share the same physical dimensions and units, typically expressed in Newton-seconds or kilogram-meters per second in the SI system.

19. (3) Newton's First Law - Law of Inertia
Newton's first law of motion is widely recognized as the law of inertia. It states that an object will remain at rest or in uniform motion unless acted upon by an external force. This principle highlights the inherent resistance of matter to changes in its velocity. In contrast, the second law relates force to acceleration, while the third law concerns action and reaction.

20. (4) Inertial frame
An inertial frame of reference is a coordinate system that is either at rest or moving at a constant velocity. In such frames, Newton's first law of motion remains valid, meaning objects experience no acceleration unless a net force is applied. Non-inertial frames are those that are accelerating or rotating, where fictitious forces appear and the standard laws of motion require modification.

21. (3) The square of distance between their centers
The universal law of gravitation describes the attractive force between two masses. It states that this force is directly proportional to the product of the masses and inversely proportional to the square of the distance between their centers. This inverse-square relationship means that as the distance between objects increases, the gravitational pull weakens significantly, following a predictable and precise mathematical pattern.

22. (1) I, II and III
Mass is a fundamental scalar property representing the amount of matter in an object and remains constant regardless of location. Weight is a vector quantity representing the gravitational force acting on that mass and varies based on gravity's strength. While weight can become zero in certain conditions, such as deep space, mass can never be zero for any physical object or body.

23. (4) The poles
Acceleration due to gravity varies across the Earth's surface due to its flattened shape and rotation. The planet is an oblate spheroid, meaning the distance from the center to the surface is shortest at the poles. Because gravitational pull is stronger when closer to the center, the value of g reaches its maximum at the poles and its minimum at the equator.

NODIA

24. (1) Acceleration remains constant
During free fall in a vacuum near the Earth's surface, all objects experience a constant acceleration due to gravity, approximately 9.8 meters per second squared. While the velocity of the falling object increases uniformly over time, the rate at which it speeds up remains the same. Air resistance is ignored in this idealized model to focus on pure gravitational influence on motion.

25. (2) 11.2 km/s
Escape velocity is the minimum speed an object must reach to break free from a planet's gravitational field without further propulsion. For Earth, this value is approximately 11.2 kilometers per second. If an object is launched at this speed, its kinetic energy will exactly balance its gravitational potential energy, allowing it to move infinitely far away from the Earth's pull.

26. (1) Henry Cavendish
Henry Cavendish was the first scientist to accurately measure the value of the universal gravitational constant, known as G, using a torsion balance. His famous 1798 experiment allowed for the calculation of the Earth's density and mass. While Isaac Newton formulated the law of universal gravitation, he did not experimentally determine the specific value of the constant required for calculations.

27. (4) They are in a constant state of free fall towards the Earth
Astronauts in orbit experience weightlessness not because gravity is absent, but because they and their spacecraft are in a state of continuous free fall towards Earth. As they move forward at high

speed, the planet's surface curves away at the same rate they fall. This creates an environment where no normal force acts between the astronauts and their surroundings.

28. (1) II, III, I
Surface gravity depends on a planet's mass and radius. Mars has a lower mass than Earth, resulting in weaker gravitational pull. Jupiter, being the most massive planet in the solar system, possesses the strongest surface gravity among the three. Therefore, the correct sequence from the weakest to the strongest gravitational force is Mars, followed by Earth, and then Jupiter as the highest.

29. (3) Angular momentum
Kepler's second law states that a line segment joining a planet and the Sun sweeps out equal areas during equal intervals of time. This phenomenon is a direct consequence of the conservation of angular momentum in a central force field. As a planet moves closer to the Sun, its orbital speed increases to ensure its total angular momentum remains constant throughout its orbit.

30. (4) There is no exception; all objects fall at the same rate in a vacuum
In a vacuum, where air resistance is absent, all objects experience the same acceleration due to gravity regardless of their mass or shape. This principle, famously demonstrated by Galileo, confirms that a feather and a heavy coin will hit the ground simultaneously when dropped from the same height. Therefore, there are no exceptions to this rule in a truly friction-free environment.

31. (1) When the force is perpendicular to the direction of displacement
Work is defined as the product of the force applied and the displacement in the direction of that force. Mathematically, it involves the cosine of the angle between the force and displacement vectors. When these vectors are perpendicular, the cosine of ninety degrees is zero, resulting in no work being performed. Examples include a person carrying a load horizontally at a constant speed.

32. (3) Four times the original
Kinetic energy is calculated using the formula one-half mass times the square of velocity. Because the velocity term is squared, any change in speed has a non-linear effect on the energy. Doubling the velocity of an object results in a factor of two squared, which means the kinetic energy increases to four times its original value, assuming the mass remains constant.

33. (2) Kilowatt-hour
The kilowatt-hour is the standard unit used by utility companies to measure and bill electrical energy consumption. It represents the energy consumed by a one-thousand-watt appliance operating for one hour. While the Joule is the standard SI unit for energy, it is too small for practical commercial use. One kilowatt-hour is equivalent to three point six million Joules of electrical energy.

34. (3) IV only
Most energy transformations are correctly described: generators convert mechanical to electrical energy, motors do the reverse, solar cells use light, and batteries use chemical energy. However, a microphone actually converts sound energy into electrical signals, not the other way around. A loudspeaker is the device that converts electrical energy back into sound, making the statement about microphones technically inaccurate here.

35. (3) Kinetic energy is converted into potential energy
At the mean position, a swinging pendulum possesses maximum kinetic energy and minimum potential energy. As it moves toward the extreme position, its height increases and its speed decreases. This process converts kinetic energy into gravitational potential energy. At the highest point of the swing, the pendulum momentarily stops, and its energy is entirely potential before it begins the return journey downward.

36. (2) 746 W
Horsepower is a unit of power originally developed to compare the output of steam engines with the power of draft horses. In the metric system, one mechanical horsepower is defined as approximately seven hundred and forty-six watts. This unit is still commonly used today in

NODIA

the automotive and industrial sectors to describe the power ratings of internal combustion engines and large electric motors.

37. (3) 490 J
Work done in lifting an object against gravity is equal to the product of its mass, the acceleration due to gravity, and the height. For a ten-kilogram object lifted five meters with gravity at nine point eight meters per second squared, the calculation results in four hundred and ninety Joules. This value represents the gravitational potential energy gained by the object during lift.

38. (2) Energy can only be transformed, not created or destroyed
The law of conservation of energy is a fundamental principle stating that energy cannot be created or destroyed within an isolated system. Instead, it can only change from one form to another, such as potential energy becoming kinetic energy. Consequently, the total amount of energy remains constant over time, ensuring that energy is always accounted for during any physical process.

39. (1) A-iii, B-iv, C-i, D-ii
Loudspeakers convert electrical signals into sound energy. Dynamos transform mechanical motion into electrical energy. Photosynthesis is a biological process that converts light energy from the sun into chemical energy stored in glucose. Steam engines utilize heat from burning fuel to produce mechanical work. These examples demonstrate the diverse ways in which energy is transformed to perform useful functions in technology.

40. (2) Negative
Kinetic friction always acts in the direction opposite to the displacement of a moving object. Because the force and displacement vectors are in opposite directions, the work done by friction is mathematically negative. This negative work indicates that energy is being removed from the object's kinetic energy and typically dissipated as heat, causing the object to slow down unless another force acts.

41. (3) Conduction
Conduction is the primary mode of heat transfer in solid materials, particularly metals. It occurs as high-energy particles collide with neighboring ones, transferring thermal energy through the substance. In metals, this process is highly efficient due to the presence of free electrons that can move rapidly and transport heat across the lattice, making metals much better conductors than non-metallic solids.

42. (1) Radiation
Radiation is a mode of heat transfer that utilizes electromagnetic waves to transport energy. Unlike conduction and convection, it does not require a physical medium like a solid, liquid, or gas to move through. This is why heat from the Sun can travel through the vast vacuum of space to reach the Earth, providing the energy necessary for life and climate systems.

43. (3) -273.15 degrees Celsius
Absolute zero is the lowest theoretical temperature where all molecular motion ceases. On the Kelvin scale, this point is defined as zero K. To convert this to the Celsius scale, one must subtract two hundred and seventy-three point one five. Therefore, absolute zero corresponds to negative two hundred and seventy-three point one five degrees Celsius, representing the absolute limit of coldness.

44. (1) 0 to 4 degrees Celsius
Most substances contract when cooled, but water exhibits a unique behavior called anomalous expansion between zero and four degrees Celsius. As water is heated from zero degrees, its density increases and its volume decreases until it reaches four degrees. This property is vital for aquatic life, as it ensures that the densest water sinks to the bottom, preventing lakes from freezing solid.

45. (1) Both A and R are true and R is the correct explanation of A.
Water possesses an exceptionally high specific heat capacity, meaning it can absorb a large amount of heat energy with only a small increase in its own temperature. This property makes it an ideal coolant for automobile engines. By circulating through the radiator, water effectively removes excess thermal energy generated during combustion, preventing the engine from overheating while maintaining stable operating temperatures.

Downloaded from www.pdf.tube

46. (4) Latent heat of fusion
The latent heat of fusion is the specific amount of thermal energy required to change a substance from its solid state to a liquid state without changing its temperature. This process occurs at the melting point under constant atmospheric pressure. The energy is used to break the molecular bonds within the solid lattice rather than increasing the kinetic energy of the particles themselves.

47. (1) Convection currents in the atmosphere
Sea and land breezes are driven by differential heating between land and water. Land heats up and cools down faster than the ocean. During the day, warm air over the land rises, creating a low-pressure area that pulls in cooler air from the sea. This movement of air, known as a convection current, reverses at night as the land cools more rapidly.

48. (2) expands uniformly across a wide temperature range
Mercury is favored for use in clinical thermometers because it expands uniformly across a wide range of temperatures, ensuring accurate readings. As a metal, it is a good conductor of heat and responds quickly to changes. Furthermore, its silver color makes it easy to see against the glass, and it does not wet or stick to the capillary tube's internal surface.

49. (2) A rough black surface
The ability of a surface to emit thermal radiation is closely related to its ability to absorb it. According to Kirchhoff's law, good absorbers are also good emitters. Dark, rough, or matte surfaces absorb almost all incident radiation and emit thermal energy much more efficiently than light-colored, smooth, or polished surfaces, which tend to reflect radiation instead of absorbing it.

50. (2) Increases
Adding a non-volatile solute like salt to pure water causes a phenomenon known as boiling point elevation. The salt particles interfere with the water molecules' ability to escape into the vapor phase, requiring more thermal energy to reach a vapor pressure equal to the atmospheric pressure. Consequently, the temperature at which the solution boils is higher than that of pure water alone.

NODIA

51. (1) I and II only
Light travels at its maximum speed in a vacuum and slows down when entering denser media like glass. Refraction is the bending of light as it crosses boundaries between materials with different optical densities. Regarding reflection, the law states that the angle of incidence is always equal to the angle of reflection, not less than it, making the third statement factually incorrect.

52. (4) Dispersion
Dispersion is the process where white light separates into its constituent colors—red, orange, yellow, green, blue, indigo, and violet—when passing through a medium like a glass prism. This happens because different wavelengths of light travel at different speeds and refract at slightly different angles. This fundamental optical phenomenon is responsible for the natural formation of rainbows in the sky after rain.

53. (3) Total internal reflection
A mirage is an optical illusion caused by the refraction and total internal reflection of light in the atmosphere. On hot days, layers of air near the ground become much warmer and less dense than the air above. Light from the sky travels through these layers and bends upward, creating a displaced image that often looks like a pool of shimmering water.

54. (2) Concave lens
Myopia, or near-sightedness, occurs when the eye's lens is too curved or the eyeball is too long, causing images to focus in front of the retina rather than on it. To correct this, a concave or diverging lens is used. This lens spreads the incoming light rays outward before they reach the eye, allowing the image to focus correctly on the retinal surface.

55. (4) Scattering of shorter solar wavelengths by air molecules
The blue appearance of the sky is a result of Rayleigh scattering. When sunlight enters the Earth's atmosphere, it interacts with gas molecules and small particles. Shorter wavelengths of light, specifically blue and violet, are scattered in all directions more efficiently than longer wavelengths. Although violet scatters more, our eyes are more sensitive to blue, making the sky appear blue.

56. (1) Concave mirror
Dentists use concave mirrors to examine teeth because they can produce a magnified, upright, and clear virtual image of an object when it is placed close to the mirror's surface. This magnification allows the dentist to see fine details and small cavities that might be missed with the naked eye, improving diagnostic accuracy during dental procedures.

57. (1) A-iii, B-iv, C-i, D-ii
Total internal reflection is the principle behind optical fibers. Scattering of light by the atmosphere causes the sun to appear red at sunrise. Dispersion of sunlight by water droplets creates rainbows. The twinkling of stars is caused by atmospheric refraction as light passes through varying air densities. These phenomena illustrate how light interacts with different media to produce distinct visual effects.

58. (1) Diopters
The power of a lens is a measure of its ability to converge or diverge light rays and is mathematically defined as the reciprocal of its focal length in meters. The standard unit for measuring this power is the diopter. A lens with a short focal length has a higher power in diopters, indicating a stronger bending effect on the light passing through it.

59. (2) Away from the normal
When light travels from an optically denser medium, like water, into a rarer medium, like air, its speed increases. This change in speed causes the light ray to bend away from the normal line at the boundary. If the angle of incidence exceeds a certain critical value, the light will undergo total internal reflection and remain within the denser medium entirely.

60. (2) 299,792,458 m/s
The speed of light in a vacuum is a fundamental physical constant. It is defined exactly as two hundred and ninety-nine million, seven hundred and ninety-two thousand, four hundred and fifty-eight meters per second. This value is used to define the meter in the International System of Units. While often rounded for simplicity, the exact figure is fixed and unchanging in physics.

61. (3) Longitudinal mechanical waves
Sound waves in air are classified as longitudinal mechanical waves because the particles of the medium vibrate back and forth in the same direction that the wave travels. These waves consist of alternating regions of high pressure, called compressions, and low pressure, called rarefactions. Because they require a physical medium like air to propagate, sound cannot travel through a vacuum.

62. (4) Frequency
The pitch of a sound is the human perception of how "high" or "low" a note sounds. This characteristic is primarily determined by the frequency of the sound wave, which is the number of vibrations per second. Higher frequencies are perceived as higher pitches, while lower frequencies correspond to lower pitches. Amplitude, in contrast, determines the loudness or intensity of the sound.

63. (1) I, II and IV
Sound travels fastest in solids due to the close proximity of atoms, and its speed increases with temperature because particles move more quickly. Humid air is less dense than dry air, which actually allows sound to travel faster. Crucially, sound is a mechanical wave and requires a medium to propagate; therefore, it cannot travel through a vacuum, making that statement incorrect.

64. (2) 17.2 meters
To hear a distinct echo, the human ear requires a time interval of at least zero point one seconds between the original sound and the reflected one. Given the speed of sound in air is approximately three hundred and forty-four meters per second, the sound must travel a total distance of thirty-four point four meters. Thus, the reflecting surface must be half that distance.

65. (2) SONAR
SONAR, which stands for Sound Navigation and Ranging, is a technique that uses ultrasonic sound waves to detect and locate objects underwater. A transmitter sends out a sound pulse, which reflects off objects and returns to a receiver. By measuring the time delay between the emission and the echo, the distance and position of underwater obstacles can be accurately determined.

Click Here to Buy book on Amazon

66. (2) 20 Hz to 20,000 Hz
The normal audible frequency range for a healthy human ear typically spans from twenty Hertz to twenty thousand Hertz. Frequencies below this range are known as infrasonic, while those above are called ultrasonic. As humans age, the upper limit of this range often decreases, particularly affecting the ability to hear high-pitched sounds, though the lower limit generally remains stable near twenty Hertz.

67. (3) Amplitude
Loudness is the subjective perception of sound intensity and is directly determined by the amplitude of the sound wave. Amplitude represents the maximum displacement of particles from their rest position. Waves with larger amplitudes carry more energy and are perceived as louder, while smaller amplitudes result in softer sounds. This relationship is often measured on a logarithmic scale using decibels as units.

68. (4) Ultrasonography
Ultrasonography is a medical imaging technique that utilizes high-frequency sound waves, well above the human hearing limit of twenty thousand Hertz. These ultrasonic waves are directed into the body and reflect off internal organs and tissues. The returning echoes are captured and processed by a computer to create real-time images, making it a safe and non-invasive tool for diagnostic monitoring.

69. (1) Air < Water < Steel
The speed of sound depends on the density and elasticity of the medium. Sound travels slowest in gases like air because the molecules are far apart. In liquids like water, the particles are closer, allowing faster transmission. It travels fastest in rigid solids like steel, where strong molecular bonds and high elasticity facilitate the rapid transfer of vibrational energy between adjacent particles.

70. (2) The Doppler Effect
The Doppler Effect describes the apparent change in the frequency or wavelength of a wave as observed by someone moving relative to the wave source. As a sound source approaches an observer, the waves are compressed, leading to a higher perceived pitch. Conversely, as the source moves away, the waves stretch out, resulting in a lower perceived pitch than the original sound.

71. (4) Potential difference across its ends
Ohm's law states that for most conductors at a constant temperature, the electric current flowing through them is directly proportional to the potential difference, or voltage, across their ends. This means that increasing the voltage will lead to a corresponding increase in current, provided the resistance remains unchanged. This relationship is a fundamental principle used to analyze and design electrical circuits.

72. (1) 10 ohms
When resistors are connected in a series circuit, the total or equivalent resistance is simply the sum of the individual resistances. In this case, adding the values of two ohms, three ohms, and five ohms yields a total resistance of ten ohms. This arrangement ensures that the same current flows through each resistor, while the total voltage is divided among them.

NODIA

73. (3) Ammeter
An ammeter is a specialized electrical instrument designed to measure the rate of electric current flowing through a circuit. It is calibrated to provide readings in Amperes, the standard unit of current. To accurately capture the flow of electrons, it must be integrated directly into the circuit path so that the entire current passes through the device for measurement.

74. (1) Series
To measure the total electric current in a specific branch or circuit, an ammeter must always be connected in series. This ensures that the full flow of charge passes through the instrument. Ammeters are designed with very low internal resistance to minimize their impact on the overall circuit, preventing a significant drop in current that would occur with high-resistance devices.

75. (3) IV only
The resistance of a metallic wire is influenced by its physical dimensions and material properties. It is directly proportional to length and inversely proportional to the cross-sectional area. Stretching a wire increases length and decreases area, raising resistance. Crucially, resistance is not constant with temperature; for most metals,

it increases as the temperature rises, making the statement about temperature independence incorrect.

76. (1) 50 Hz
In India, the standard domestic electrical power supply provides alternating current at a frequency of fifty Hertz. This means the direction of the current changes one hundred times every second. Additionally, the standard voltage for home use is typically two hundred and twenty volts. This frequency and voltage combination is used to ensure compatibility and efficiency across the national electrical grid.

77. (3) Heating effect of current
An electric fuse is a critical safety device designed to protect circuits from excessive current. Its operation is based on the heating effect of electric current. The fuse contains a wire with a low melting point; when the current exceeds a safe limit, the heat generated causes the wire to melt and break the circuit, preventing damage to appliances and electrical fires.

78. (4) Square of the current
Joule's law of heating quantifies the thermal energy produced when an electric current passes through a conductor. It states that the heat generated is directly proportional to the square of the current, the resistance of the conductor, and the time for which the current flows. Because of the squared relationship, even a small increase in current leads to a much larger increase in heat.

79. (1) Superconductors
Superconductors are unique materials that exhibit exactly zero electrical resistance when cooled below a specific critical temperature. In this state, they can carry electric current indefinitely without any loss of energy as heat. This phenomenon also allows them to expel magnetic fields, a property known as the Meissner effect, which has significant applications in advanced technologies like magnetic levitation and medical imaging.

80. (1) Both A and R are true and R is the correct explanation of A.
Silver is the most efficient conductor of electricity due to its high electron mobility. However, it is not used for large-scale power transmission because its high cost makes it economically unfeasible. Copper and aluminum offer a better balance of high conductivity, lower cost, and abundance. Additionally, using silver would significantly increase the risk of theft from utility infrastructure due to its value.

81. (2) North pole to South pole
Magnetic field lines are imaginary lines used to represent the direction and strength of a magnetic field. Outside a permanent bar magnet, these lines emerge from the north pole and curve around to enter the south pole. Inside the magnet itself, the lines continue from the south pole back to the north pole, forming continuous, closed loops that never intersect each other.

82. (1) Maxwell's Right-Hand Thumb Rule
Maxwell's Right-Hand Thumb Rule is used to determine the direction of the circular magnetic field around a straight current-carrying wire. If the thumb of the right hand points in the direction of the conventional current, the curled fingers indicate the direction of the magnetic field lines. This simple rule is fundamental for understanding the relationship between electricity and magnetism in conductors.

83. (3) Soft iron
Soft iron is the most suitable material for the core of an electromagnet because it is easily magnetized and demagnetized. When electric current flows through the surrounding coil, the soft iron becomes a strong magnet. As soon as the current is switched off, it loses almost all its magnetism quickly. This property allows for precise control over the magnetic field in many applications.

84. (4) Electromagnetic induction
Electromagnetic induction is the process of generating an electromotive force and subsequently an electric current in a closed circuit by changing the magnetic environment. This can be achieved by moving a magnet relative to a coil or by changing the current in a nearby circuit. Discovered by Michael Faraday, this principle is the foundation for the operation of electric generators and transformers.

Downloaded from www.pdf.tube

85. (3) Current-carrying conductors in magnetic fields experience force
An electric motor operates on the principle that a conductor carrying an electric current will experience a mechanical force when placed within an external magnetic field. The interaction between the magnetic field produced by the current and the external field results in a torque that causes the motor's rotor to spin. This process effectively converts electrical energy into useful mechanical work or motion.

86. (1) A-iii, B-ii, C-iv, D-i
Fleming's Left-Hand Rule determines the force direction in motors, while his Right-Hand Rule finds induced current direction in generators. Lenz's Law relates induction to the conservation of energy, stating that induced effects oppose their cause. Faraday's Law provides the mathematical framework for calculating the magnitude of induced EMF. Together, these principles explain how magnetic fields and electric currents interact in technology.

87. (4) Michael Faraday
Michael Faraday was a pioneering scientist who discovered the phenomenon of electromagnetic induction in 1831. Through his experiments with moving magnets and coils, he demonstrated that a changing magnetic field could induce an electric current. This discovery revolutionized science and technology, leading to the development of the electric motor, generator, and transformer, which are essential to modern power systems and electronics.

88. (1) Ferromagnetic
Materials like iron, nickel, and cobalt are classified as ferromagnetic because they exhibit strong magnetic properties and are highly attracted to magnets. In these substances, atoms have unpaired electrons that align their magnetic moments in small regions called domains. When exposed to an external magnetic field, these domains align, causing the material to become strongly magnetized and sometimes retain permanent magnetism.

89. (3) Commutator
A commutator is a rotary electrical switch used in certain types of electric motors and generators. Its primary function is to periodically reverse the direction of current between the external circuit and the rotating coils. This reversal ensures that the magnetic force continues to pull the rotor in the same direction, allowing for continuous rotation rather than just a partial turn or oscillation.

90. (1) It behaves magnetically like the south pole of a bar magnet.
The Earth acts like a giant bar magnet, but its magnetic poles are not identical to its geographic ones. The point referred to as the magnetic north pole actually behaves like the south pole of a magnet. This is why the north-seeking end of a compass needle, which is a north pole, is attracted to and points toward the Earth's northern regions.

91. (4) Protons and neutrons
The nucleus is the small, dense central region of an atom. It is composed of two types of subatomic particles collectively known as nucleons: protons, which carry a positive electrical charge, and neutrons, which have no charge. Together, these particles account for nearly all of the atom's mass, while the negatively charged electrons orbit the nucleus at relatively large distances.

92. (1) I and II only
Electrons are fundamental subatomic particles with a negative charge. Their mass is extremely small, approximately one eighteen-hundred-thirty-sixth that of a proton. Crucially, electrons do not reside within the nucleus; instead, they are found in the space surrounding the nucleus, organized into energy levels. This external positioning is essential for chemical bonding and electrical conductivity in materials.

NODIA

93. (3) Protons in its nucleus
The atomic number is a fundamental property of an element that defines its identity. It represents the total number of protons found in the nucleus of every atom belonging to that element. In a neutral atom, the atomic number also equals the number of electrons. Because the number of protons determines the chemical behavior, no two different elements share the same atomic number.

94. (4) Isotopes
Isotopes are variants of a particular chemical element that have the same number of protons

and thus the same atomic number. However, they differ in the number of neutrons in their nuclei, resulting in different mass numbers. While isotopes of an element share almost identical chemical properties, they may exhibit different physical properties and varying levels of stability or radioactive decay.

95. (1) The same mass number but different atomic numbers
Isobars are atoms of different chemical elements that possess the same mass number but have different atomic numbers. This means they have the same total number of nucleons (protons plus neutrons) in their nuclei, but the specific ratio of protons to neutrons varies. Because they have different atomic numbers, isobars belong to different elements and exhibit distinct chemical and physical properties.

96. (2) Niels Bohr
Niels Bohr proposed a revolutionary atomic model in 1913, often described as the planetary model. He suggested that electrons revolve around the nucleus in specific, discrete circular orbits with fixed energy levels. In this model, electrons can only exist in these allowed orbits and can jump between them by absorbing or emitting energy, explaining the unique spectral lines observed in hydrogen atoms.

97. (2) Atomic nucleus
Ernest Rutherford's famous gold foil experiment involved firing alpha particles at a thin sheet of gold. While most particles passed through, some were deflected at large angles. This unexpected result led to the conclusion that atoms are mostly empty space, with their positive charge and most of their mass concentrated in a tiny, dense central region which Rutherford named the atomic nucleus.

98. (1) II, III, IV, I
The understanding of atomic structure evolved through several key models. John Dalton first proposed the solid sphere model in the early eighteen-hundreds. J.J. Thomson followed with the "plum pudding" model after discovering the electron. Ernest Rutherford then introduced the nuclear model based on his scattering experiments. Finally, Niels Bohr refined this by adding quantized electron orbits, creating the modern planetary model.

99. (3) Valency
Valency is the measure of an element's combining capacity with other atoms when forming chemical compounds or molecules. It is fundamentally determined by the number of electrons in the atom's outermost shell, known as valence electrons. Atoms tend to gain, lose, or share these electrons to achieve a stable electronic configuration, typically resembling that of the nearest noble gas in the periodic table.

100. (4) Atomic number
The modern periodic table organizes chemical elements based on their increasing atomic number, which is the number of protons in an atom's nucleus. This arrangement, established by Henry Moseley, replaced earlier versions based on atomic mass. By using atomic numbers, elements with similar electronic configurations and chemical properties fall into the same vertical columns, known as groups, revealing clear periodic trends.

101. (3) Complete transfer of one or more electrons from one atom to another
An ionic bond is a type of chemical link formed through the complete transfer of one or more electrons from one atom to another. This typically occurs between a metal and a non-metal. The atom that loses electrons becomes a positively charged cation, while the atom that gains them becomes a negatively charged anion. The strong electrostatic attraction between these oppositely charged ions holds them together.

102. (2) Water (H_2O)
Covalent bonding occurs when two atoms share one or more pairs of valence electrons to achieve stability. This typically happens between non-metal atoms. In water, each oxygen atom shares electrons with two hydrogen atoms, forming stable covalent bonds. In contrast, substances like sodium chloride and magnesium oxide are held together by ionic bonds resulting from the transfer of electrons between metals and non-metals.

Click Here to Buy book on Amazon

103. (4) Delocalized valence electrons
Metallic bonding is characterized by a unique structure where positive metal ions are arranged in a rigid lattice. These ions are surrounded by a "sea" of delocalized valence electrons that are free to move throughout the entire solid. This mobility of electrons is responsible for the characteristic properties of metals, such as high electrical and thermal conductivity, malleability, and metallic luster.

104. (1) I and III only
Ionic compounds are characterized by strong electrostatic forces, leading to high melting and boiling points. In their solid state, ions are fixed in a lattice and cannot move, making them poor conductors. However, when dissolved in water or melted, the ions become free to move and conduct electricity. Most ionic compounds are soluble in polar solvents like water but not in non-polar ones.

105. (3) Intermolecular forces between molecules are relatively weak
Covalent compounds consist of individual molecules held together by strong internal covalent bonds. However, the forces acting between these separate molecules, known as intermolecular forces, are relatively weak. When these substances are heated, only a small amount of thermal energy is needed to overcome these weak attractions and separate the molecules, resulting in typically low melting and boiling points compared to ionic compounds.

106. (1) Hydrogen bonding
Water molecules are polar, with oxygen being more electronegative than hydrogen. This creates dipoles that lead to a special type of intermolecular attraction called hydrogen bonding. These bonds are much stronger than typical van der Waals forces. Consequently, significant thermal energy is required to break these attractions and transition water from a liquid to a gas, explaining its unusually high boiling point.

107. (4) One atom donates both electrons to the shared pair
A coordinate covalent bond, also known as a dative bond, is a specific type of covalent link where the shared pair of electrons is provided entirely by one of the two atoms. The donor atom must have a lone pair of electrons, while the acceptor atom usually has a vacant orbital to accommodate the pair. Once formed, it is indistinguishable from a standard covalent bond.

108. (2) Attract a shared electron pair in a covalent bond
Electronegativity is a chemical property that describes the tendency of an atom to attract a shared pair of electrons toward itself within a covalent bond. Atoms with high electronegativity pull electrons more strongly than atoms with lower values. This unequal sharing leads to the formation of polar bonds and influences the overall polarity and reactivity of the resulting molecule in chemical reactions.

109. (3) N_2
A nonpolar covalent bond occurs when electrons are shared equally between two atoms of the same element, as they have identical electronegativity. In a nitrogen molecule, the two nitrogen atoms share three pairs of electrons equally, resulting in no partial charges. In contrast, molecules like water and ammonia have polar bonds because their different atoms have varying strengths of attraction for the shared electrons.

110. (1) A-ii, B-iv, C-i, D-iii
Potassium chloride is an ionic compound formed by electron transfer. Methane features covalent bonds where electrons are shared between carbon and hydrogen. Copper wire exhibits metallic bonding with a sea of delocalized electrons. The ammonium ion is notable for containing a coordinate covalent bond, where the nitrogen atom donates an electron pair to a hydrogen ion. These examples highlight the major bonding categories.

111. (1) Hydrogen ions (H^+)
The pH scale is a logarithmic measure used to specify the acidity or basicity of an aqueous solution. It is fundamentally based on the molar concentration of hydrogen ions present in the liquid. Solutions with a high concentration of hydrogen ions have a low pH and are acidic, while those with a low concentration have a high pH and are considered basic or alkaline.

Downloaded from www.pdf.tube

112. (4) 3
Litmus paper is a common acid-base indicator used to test the chemical nature of a solution. When blue litmus paper turns red, it indicates that the substance is acidic. On the pH scale, which ranges from zero to fourteen, acidic solutions have values less than seven. Therefore, a pH of three clearly represents an acidic environment capable of producing this specific color change.

113. (2) Completely dissociate into ions in water
A strong acid is defined by its ability to undergo complete ionization or dissociation when dissolved in water. This means that almost every acid molecule breaks apart to release hydrogen ions into the solution. In contrast, weak acids only partially dissociate, with most molecules remaining intact. Common examples of strong acids include hydrochloric acid and sulfuric acid, which are highly reactive and conduct electricity.

114. (1) Neutralization
Neutralization is a chemical reaction in which an acid and a base react quantitatively with each other to produce a salt and water. During this process, the hydrogen ions from the acid combine with the hydroxide ions from the base to form neutral water molecules. The resulting solution is typically closer to neutral pH, provided the reactants are balanced in their respective strengths.

115. (3) Magnesium hydroxide
Milk of magnesia is a common medicinal suspension used to treat indigestion and heartburn. Chemically, it is known as magnesium hydroxide. As a mild base, it works by reacting with the excess hydrochloric acid in the stomach through a neutralization reaction. This process reduces the overall acidity in the digestive tract, providing relief from the discomfort and irritation caused by acid reflux.

116. (4) V only
Most of the listed salts are correctly matched with their chemical names: baking soda is sodium bicarbonate and bleaching powder is calcium oxychloride. However, common table salt is chemically sodium chloride, not potassium chloride. While potassium chloride is sometimes used as a salt substitute for dietary reasons, it is not the primary component of the standard table salt used globally for seasoning.

117. (3) Lactic acid
Lactic acid is the organic acid naturally present in sour milk, curd, and yogurt. It is produced when certain bacteria, such as Lactobacillus, ferment the lactose sugar found in milk. This fermentation process increases the acidity of the milk, causing the proteins to coagulate and giving curd its characteristic tangy flavor and thick texture, while also acting as a natural preservative.

118. (2) Formic (Methanoic) acid
When ants or bees sting, they inject a small amount of formic acid, also known as methanoic acid, into the skin. This chemical is responsible for the sharp pain, redness, and swelling associated with the bite. Because it is an acid, its effects can sometimes be neutralized by applying a mild base, such as baking soda paste, which helps to alleviate the irritation.

119. (3) 5.6
Normal rainwater is slightly acidic, with a pH of about five point six, due to dissolved carbon dioxide forming weak carbonic acid. However, when the pH drops below this level, it is classified as acid rain. This increased acidity is primarily caused by sulfur dioxide and nitrogen oxides from industrial activities reacting with water vapor in the atmosphere to form stronger acids.

120. (3) Acidic salt
When a strong acid reacts with a weak base, the resulting salt is classified as an acidic salt. This occurs because the strong acid provides more hydrogen ions than the weak base can effectively neutralize. When such a salt is dissolved in water, it undergoes partial hydrolysis, releasing excess hydrogen ions and resulting in a solution with a pH value of less than seven.

121. (3) Catenation
Catenation is the unique ability of carbon atoms to form stable covalent bonds with one another, resulting in long chains, branched structures, or closed rings. This property is due to carbon's small atomic size and the significant strength of the carbon-carbon bond. Catenation is the fundamental reason for the vast diversity and

NODIA

complexity of organic molecules, which form the basis of life.

122. (1) Both A and R are true and R is the correct explanation of A.
Graphite and diamond are allotropes of carbon with different structures. In diamond, each carbon atom is covalently bonded to four others in a rigid tetrahedron, leaving no free electrons. In graphite, each atom is bonded to only three others in layers, leaving one delocalized electron per atom. These free electrons are mobile, allowing graphite to conduct electricity, whereas diamond remains an insulator.

123. (3) 60
Buckminsterfullerene is a unique allotrope of carbon where sixty carbon atoms are arranged in a hollow, spherical structure resembling a soccer ball. This molecule, often called a "buckyball," consists of interconnected pentagons and hexagons. Discovered in the late twentieth century, it has distinctive physical and chemical properties that have opened new fields in nanotechnology, material science, and potential medical delivery systems.

124. (2) Unsaturated hydrocarbons
Hydrocarbons are organic compounds composed entirely of hydrogen and carbon. Saturated hydrocarbons, like alkanes, contain only single bonds between carbon atoms. In contrast, unsaturated hydrocarbons possess at least one carbon-carbon double bond, as in alkenes, or a triple bond, as in alkynes. These multiple bonds make unsaturated compounds generally more reactive than their saturated counterparts, as they can undergo chemical addition reactions.

125. (3) Homologous series
A homologous series is a group of organic compounds that share the same functional group and exhibit similar chemical properties. Each successive member in the series differs from the previous one by a constant methylene unit, which is one carbon and two hydrogen atoms. This structural regularity leads to a predictable gradation in physical properties, such as boiling points, as the molecular mass increases.

126. (4) Isomers
Isomers are chemical compounds that have identical molecular formulas but different structural arrangements of their atoms. Because the atoms are linked in different ways or organized differently in space, isomers can exhibit significantly different physical and chemical properties. This phenomenon is particularly prevalent in organic chemistry, where the complexity of carbon chains allows for numerous ways to assemble the same atoms.

127. (1) Carboxylic acids
The functional group composed of a carbon atom double-bonded to an oxygen atom and single-bonded to a hydroxyl group is called a carboxyl group. It is represented by the formula dash C O O H. Organic compounds containing this specific group are classified as carboxylic acids. Examples include acetic acid found in vinegar and citric acid found in citrus fruits, which exhibit acidic properties.

128. (1) A-iv, B-iii, C-ii, D-i
In organic chemistry nomenclature, specific suffixes identify functional groups. Alcohols are designated with the suffix "-ol," while aldehydes end in "-al." Ketones are identified by the suffix "-one," and carboxylic acids use "-oic acid." These standardized IUPAC rules ensure that the name of a compound clearly reflects its chemical structure and the primary functional group responsible for its characteristic reactivity.

129. (2) Saponification
Saponification is the chemical process used to manufacture soap. It involves the alkaline hydrolysis of esters, typically fats or oils, by heating them with a strong base like sodium hydroxide or potassium hydroxide. This reaction breaks down the triglycerides into glycerol and the salts of fatty acids, which we use as soap. The resulting molecules have both hydrophilic and hydrophobic parts.

130. (1) Methane
Methane is the primary component of both natural gas and biogas, which is produced by the anaerobic decomposition of organic matter like cow dung or agricultural waste. It is a simple hydrocarbon with one carbon atom and four hydrogen atoms. Because it burns cleanly and

Click Here to Buy book on Amazon

releases significant energy, methane is a vital fuel source for heating, cooking, and generating electricity worldwide.

131. (3) Malleability
Malleability is a physical property of metals that allows them to be hammered, pressed, or rolled into thin sheets without breaking or cracking. This occurs because the layers of atoms in a metallic lattice can slide over each other when pressure is applied. Gold is the most malleable of all metals, followed by silver and aluminum, making them useful for various industrial applications.

132. (4) Mercury
Mercury is a unique chemical element that is classified as a metal but remains in a liquid state at standard room temperature and pressure. This behavior is due to its unique electronic configuration, which results in weak bonding between its atoms. Because it is a liquid and a good conductor, it has been widely used in thermometers, barometers, and various electrical switches.

133. (3) Bromine
Most non-metals are either gases or solids at room temperature. Bromine is the only non-metallic element that exists as a liquid under standard conditions. It is a reddish-brown, volatile liquid with a sharp, unpleasant odor. Belonging to the halogen group, bromine is highly reactive and is commonly used in flame retardants, water treatment chemicals, and as a reagent in organic synthesis.

134. (1) I and II only
In the reactivity series, more reactive metals can displace less reactive ones from their compounds. Highly unreactive metals like gold and platinum are found at the bottom. However, only metals placed above hydrogen in the series are capable of displacing hydrogen from dilute acids to release gas. Metals below hydrogen, such as copper and silver, do not react in this way.

135. (4) Amphoteric oxides
Amphoteric oxides are metallic oxides that show both acidic and basic characteristics. They can react with both acids and bases to produce salt and water. Common examples include aluminum oxide and zinc oxide. This dual reactivity is important in chemistry for identifying specific metal ions and is utilized in industrial processes where pH control and chemical neutralization are necessary for various reactions.

136. (1) Calcination
Calcination is a metallurgical process where carbonate ores are heated strongly in the absence or limited supply of air. This thermal treatment causes the ore to decompose, releasing carbon dioxide gas and leaving behind the metal oxide. This step is essential for preparing the ore for the subsequent reduction process, which eventually extracts the pure metal from its naturally occurring form.

NODIA

137. (3) Aluminum
Anodizing is an electrochemical process used to increase the thickness of the natural oxide layer on the surface of aluminum parts. This thick, protective coating improves corrosion resistance, increases surface hardness, and allows for the application of dyes for decorative purposes. Unlike iron, which rusts when oxidized, the aluminum oxide layer is stable and adheres strongly to the metal, protecting it further.

138. (1) Zinc
Galvanization is a widely used method for protecting iron and steel from atmospheric corrosion or rusting. It involves applying a thin, protective coating of zinc over the metal surface. Zinc acts as a sacrificial barrier; even if the coating is scratched, the zinc will corrode in preference to the underlying iron, effectively extending the lifespan of structural components and various hardware.

139. (4) Aluminum
Aluminum is the most abundant metallic element found in the Earth's crust, making up approximately eight percent of its total weight. While it is extremely common, it is never found in its pure metallic form in nature; instead, it occurs in various minerals, most notably bauxite. Due to its abundance, lightweight, and corrosion resistance, it is a critical material for modern industry.

140. (1) II, IV, I, III
The reactivity of metals determines how easily they lose electrons to form positive ions. Potassium

is the most reactive of the group, followed by sodium and then calcium. Magnesium is the least reactive among these four. Therefore, the correct sequence in decreasing order of their chemical reactivity is potassium, then sodium, followed by calcium, and finally magnesium at the end.

141. (3) Robert Hooke
Robert Hooke was an English scientist who, in 1665, observed thin slices of cork under a primitive compound microscope. He noticed thousands of tiny, empty compartments that reminded him of the small rooms, or "cells," inhabited by monks. While he was actually looking at dead plant cell walls, his use of the term laid the foundation for the field of modern biology.

142. (4) All cells contain a true nucleus and membrane-bound organelles
Classical Cell Theory established that all living things are made of cells, the cell is the basic unit of life, and cells come from pre-existing ones. However, the claim that all cells have membrane-bound organelles is incorrect because it excludes prokaryotes. Prokaryotic cells, such as bacteria, are complete living cells but lack a defined nucleus and other specialized internal membrane-bound structures.

143. (1) A distinct, membrane-bound nucleus
The fundamental difference between prokaryotic and eukaryotic cells is the organization of their genetic material. Eukaryotic cells have a distinct, membrane-bound nucleus that houses their DNA. In contrast, prokaryotic cells lack this structure; their genetic material is found in a region called the nucleoid, which is not separated from the rest of the cytoplasm by a protective membrane or envelope.

144. (2) Cell wall
While both plant and animal cells share many organelles like mitochondria and the nucleus, plant cells have a rigid outer layer called the cell wall. Composed mainly of cellulose, this structure provides mechanical support and protection, helping the plant maintain its shape and withstand osmotic pressure. Animal cells lack a cell wall, possessing only a flexible plasma membrane as their outer boundary.

145. (2) Generate cellular energy in the form of ATP
Mitochondria are specialized organelles found in most eukaryotic cells and are responsible for aerobic cellular respiration. They convert the chemical energy from nutrients, such as glucose, into a form that the cell can easily use, known as adenosine triphosphate or ATP. This energy production is vital for all cellular activities, earning mitochondria the nickname "the powerhouses of the cell" in biology.

146. (1) I, II and IV
Most listed organelle functions are correct: lysosomes perform digestion, ribosomes synthesize proteins, and vacuoles store various substances. However, the statement about chloroplasts is wrong; their primary role is photosynthesis, the process of converting light energy into chemical energy. Lipid synthesis is actually performed by the smooth endoplasmic reticulum, not by chloroplasts, which are exclusive to plants and some algae.

147. (3) Modification, sorting, and packaging of proteins
The Golgi apparatus serves as the central shipping and receiving department of the eukaryotic cell. It receives proteins and lipids from the endoplasmic reticulum, modifies them chemically, and then sorts them into membrane-bound vesicles for delivery to specific destinations, such as the cell membrane or lysosomes. This processing is essential for ensuring that cellular products are functional and reach locations.

148. (4) Ribosomes
The Endoplasmic Reticulum is a network of membranes within the cell. The "rough" variety, or RER, is named for its bumpy appearance under an electron microscope, which is caused by the presence of numerous ribosomes attached to its outer surface. These ribosomes are actively involved in the synthesis of proteins that are destined for secretion or for use in the cell membrane.

149. (3) Imparting colors other than green to flowers and fruits
Chromoplasts are specialized plastids found in certain plant tissues, such as the petals of flowers and the skins of ripening fruits. Unlike green chloroplasts, chromoplasts contain carotenoid

Downloaded from www.pdf.tube

pigments that produce yellow, orange, and red colors. These vibrant colors play a crucial biological role by attracting pollinators like bees and birds or animals that help in the dispersal of seeds and fruits.

150. (2) Fluid mosaic model
The fluid mosaic model is the currently accepted description of the cell membrane's structure. It depicts the membrane as a dynamic, flexible phospholipid bilayer in which various protein molecules are embedded or attached. This "mosaic" of proteins can move laterally within the "fluid" lipid layer, allowing the membrane to perform essential functions such as selective permeability, cell signaling, and structural support.

151. (4) Absorb light energy
Chlorophyll is a green pigment found within the chloroplasts of plants and algae. Its primary role in photosynthesis is to capture and absorb light energy, particularly from the blue and red wavelengths of the solar spectrum. This absorbed energy is then used to drive the chemical reactions that convert carbon dioxide and water into energy-rich glucose molecules while releasing oxygen gas.

152. (1) A-ii, B-i, C-iv, D-iii
Glycolysis occurs in the cytoplasm, while the Krebs cycle takes place in the mitochondrial matrix. In photosynthesis, the light-dependent reactions occur within the thylakoid membranes of the chloroplast, where light is captured. The light-independent dark reactions, or the Calvin cycle, take place in the surrounding stroma. These specific locations ensure that the necessary enzymes and substrates are concentrated for metabolic activity.

153. (3) The photolysis of water molecules
During the initial light-dependent stage of photosynthesis, light energy is used to split water molecules into hydrogen ions, electrons, and oxygen gas. This process is known as photolysis. The electrons and hydrogen ions are utilized in the electron transport chain to generate ATP and NADPH, while the oxygen gas is released into the atmosphere as a vital byproduct of the reaction.

NODIA

154. (1) Stomata
Stomata are microscopic pores located primarily on the undersides of plant leaves. They are surrounded by specialized guard cells that regulate their opening and closing. These openings are essential for gas exchange, allowing carbon dioxide to enter for photosynthesis and oxygen to exit. However, they also facilitate transpiration, the loss of water vapor from the plant into the surrounding environment.

155. (4) Strictly requires the presence of oxygen
Aerobic respiration is a high-efficiency metabolic process that completely breaks down glucose to produce energy, and it strictly requires the presence of oxygen. In contrast, anaerobic respiration occurs in the absence of oxygen and is much less efficient, producing far less ATP per glucose molecule. Aerobic respiration results in carbon dioxide and water, while anaerobic processes produce lactic acid or ethanol.

156. (2) ATP (Adenosine Triphosphate)
Adenosine Triphosphate, commonly known as ATP, is the universal energy currency for all living cells. It stores chemical energy in high-energy phosphate bonds that can be easily broken to power various cellular processes, including muscle contraction, active transport, and chemical synthesis. ATP is continuously generated during cellular respiration and consumed during metabolic work, maintaining the life-sustaining activities of the organism.

157. (3) Glycolysis
Glycolysis is the initial stage of glucose metabolism and is common to both aerobic and anaerobic respiration. This metabolic pathway occurs in the cytoplasm and does not require oxygen to function. It involves the breakdown of one glucose molecule into two molecules of pyruvate, producing a small net gain of ATP and providing the necessary precursors for subsequent metabolic stages.

158. (1) I, II, III and IV
Several environmental factors directly influence the rate of photosynthesis. Light intensity provides the energy, carbon dioxide concentration supplies the raw material, and temperature affects the activity of the enzymes involved. Water availability is also crucial, as it is a reactant

and maintains plant health. Atmospheric nitrogen, while abundant, is not a direct reactant or primary limiting factor for photosynthesis.

159. (1) Lactic acid
During intense physical exercise, the demand for energy may exceed the oxygen supply to the muscles. This leads to anaerobic respiration, where glucose is partially broken down into lactic acid instead of being completely oxidized. The accumulation of lactic acid in the muscle tissues causes a drop in pH, leading to fatigue and the painful involuntary contractions commonly known as muscle cramps.

160. (2) Carbon dioxide evolved to oxygen consumed
The Respiratory Quotient, or R.Q., is a dimensionless number used in biological calculations to determine the type of fuel being metabolized by an organism. It is calculated as the ratio of the volume of carbon dioxide evolved to the volume of oxygen consumed during respiration. The R.Q. value varies depending on whether carbohydrates, fats, or proteins are being used for energy.

161. (2) Autotrophs
Autotrophs are organisms capable of producing their own organic nutrients from simple inorganic substances. Most autotrophs, such as green plants and algae, use light energy through photosynthesis. Others, known as chemoautotrophs, utilize chemical energy from inorganic reactions. These primary producers form the foundation of almost all food chains, providing the essential energy source for all other life forms in the ecosystem.

162. (1) Holozoic
Human beings exhibit holozoic nutrition, a complex process that involves several distinct stages. First, solid or liquid organic food is ingested. This is followed by digestion, where complex molecules are broken down into simpler ones. These nutrients are then absorbed into the bloodstream and assimilated by the cells for energy and growth. Finally, the undigested waste material is eliminated.

163. (3) Parasitic
Cuscuta, commonly known as dodder or Amarbel, is a non-green plant that cannot perform photosynthesis because it lacks chlorophyll. Instead, it exhibits parasitic nutrition by climbing onto a host plant and using specialized root-like structures called haustoria to penetrate the host's tissues. It directly absorbs ready-made food and water from the host, often weakening or damaging the supporting plant.

164. (1) Both A and R are true and R is the correct explanation of A.
The stomach produces highly concentrated hydrochloric acid to assist in digestion and kill bacteria. To prevent this strong acid from digesting the stomach's own muscular walls, specialized cells secrete a thick layer of mucus. This mucus acts as a protective barrier, neutralizing the acid near the surface and preventing ulcers or chemical damage to the sensitive inner lining of the organ.

165. (3) Emulsify large fat globules into smaller micelles
Bile is a digestive fluid produced by the liver and stored in the gallbladder. Its primary function in the small intestine is the emulsification of fats. Bile salts break down large, insoluble fat globules into many smaller droplets called micelles. This significantly increases the surface area available for lipase enzymes to act upon, facilitating the efficient chemical digestion and subsequent absorption of lipids.

166. (2) Villi
Villi are numerous small, finger-like projections that line the inner surface of the small intestine. Their primary purpose is to dramatically increase the surface area available for the absorption of digested food. Each villus contains a network of blood capillaries and a specialized lymph vessel called a lacteal, which work together to transport absorbed nutrients efficiently from the digestive tract.

167. (4) Vitamin C
Vitamins are classified into two groups based on their solubility. Vitamins A, D, E, and K are fat-soluble and can be stored in the body's tissues. In contrast, Vitamin C and the B-complex vitamins are water-soluble. Because they are not stored in significant amounts and are easily excreted, they must be consumed regularly in the daily diet to maintain health.

Click Here to Buy book on Amazon

168. (1) Night blindness
Vitamin A is essential for maintaining healthy vision, particularly in low-light conditions, as it is a critical component of the pigment rhodopsin found in the retina. A chronic deficiency of Vitamin A can lead to night blindness, where an individual has difficulty seeing in the dark. If left untreated, severe deficiency can progress to permanent eye damage and even total blindness.

169. (3) Proteins
Kwashiorkor is a severe form of malnutrition caused by a diet that is critically deficient in proteins, even if the total caloric intake from carbohydrates is sufficient. It is most commonly seen in children in developing regions. Characteristic symptoms include a bloated abdomen, thinning hair, and swelling of the limbs, resulting from fluid imbalance and the body's inability to maintain tissues properly.

170. (1) A-iv, B-i, C-iii, D-ii
Specific nutrient deficiencies lead to well-known diseases. A lack of Vitamin B1 causes Beriberi, affecting the nervous system. Vitamin C deficiency results in Scurvy, characterized by bleeding gums and poor wound healing. Vitamin D is necessary for bone health; its absence leads to Rickets. Iron is a key component of hemoglobin, and its deficiency results in anemia, causing fatigue.

171. (4) Thermosetting plastics
Bakelite and melamine are classified as thermosetting plastics. Unlike thermoplastics, which can be melted and reshaped multiple times, thermosetting polymers undergo a permanent chemical change during their initial molding process. They form extensive cross-links between polymer chains, creating a rigid, heat-resistant structure that does not soften upon reheating. This makes them ideal for electrical insulators and durable, heat-resistant kitchenware surfaces.

172. (2) Vulcanization
Vulcanization is a chemical process used to enhance the physical properties of natural rubber. By heating the raw rubber with sulfur, cross-links are formed between the long polymer chains. This modification significantly improves the material's strength, durability, and elasticity while reducing its tackiness. Vulcanized rubber is resistant to temperature changes, making it suitable for manufacturing tires, hoses, and industrial products.

173. (3) Rayon
Rayon is a semi-synthetic fiber produced by chemically regenerating natural cellulose, typically sourced from wood pulp or cotton linters. Because it possesses a lustrous appearance and smooth texture similar to natural silk but is much more affordable, it is commonly referred to as "artificial silk." Rayon is highly versatile and is widely used in the textile industry for clothing and upholstery.

174. (4) Copper and Zinc
Brass is a versatile metallic alloy primarily composed of copper and zinc. By varying the proportions of these two metals, manufacturers can create different types of brass with specific mechanical and electrical properties. It is widely used in musical instruments, decorative hardware, and plumbing fixtures due to its attractive gold-like appearance, excellent workability, and high resistance to corrosion and wear.

175. (1) Copper and Tin
Bronze is a historically significant alloy that consists primarily of copper, with tin as the main additive. Other elements may be added to enhance specific properties. Bronze is harder and more durable than pure copper and is highly resistant to corrosion, especially from seawater. This made it the preferred material for ancient tools, statues, and modern industrial components like ship propellers.

176. (2) Wool < Cotton < Nylon
Tensile strength measures the maximum stress a material can withstand while being stretched. Among these common fibers, wool generally has the lowest tensile strength. Cotton, a natural plant fiber, is significantly stronger than wool. Nylon, a fully synthetic polymer, is engineered for extreme durability and possesses the highest tensile strength of the three, making it ideal for products like ropes and parachutes.

177. (2) Bulletproof vests and body armor
Kevlar is a high-performance synthetic fiber belonging to the aramid family. It is renowned for its exceptional tensile strength-to-weight ratio,

NODIA

being five times stronger than steel on an equal weight basis. Its unique molecular structure allows it to absorb and dissipate energy from high-velocity impacts, making it the primary material used in the manufacture of bulletproof vests and personal protective equipment.

178. (1) Polymer or plastic matrix
Fiberglass is a type of composite material where extremely fine fibers of glass are used as a reinforcement. These fibers are embedded within a liquid polymer matrix, typically a plastic resin, which is then cured into a solid. The resulting material combines the high tensile strength of the glass fibers with the flexibility and lightweight nature of the plastic, creating a durable product.

179. (3) Silica (sand)
Silica, commonly found in the form of quartz sand, is the fundamental raw material used in the production of ordinary glass. To lower the high melting point of pure silica, other substances like sodium carbonate and limestone are typically added. When heated to high temperatures, this mixture melts into a liquid that, upon cooling, forms the transparent, amorphous solid we know as glass.

180. (4) Calcium oxide (CaO)
Portland cement is a complex mixture of several chemical compounds, but calcium oxide, also known as lime, is the most abundant constituent, typically making up over sixty percent of its weight. Other important ingredients include silica, alumina, and iron oxide. These compounds are produced by heating a precisely proportioned mixture of limestone and clay in a kiln for construction applications.

181. (3) They do not form scum in hard water
Hard water contains high concentrations of dissolved minerals, such as calcium and magnesium ions. Traditional soaps react with these ions to form an insoluble, sticky precipitate known as scum, which reduces cleaning efficiency. Synthetic detergents, however, are specifically formulated so their salts are soluble in water even in the presence of these minerals, allowing them to lather easily in hard water.

182. (1) I and II only
Bleaching powder is produced by reacting chlorine gas with dry slaked lime, a process that yields calcium oxychloride. It is highly effective as a disinfectant for treating drinking water and as a bleaching agent in textiles. However, it does not release oxygen when exposed to air; instead, it reacts with atmospheric carbon dioxide to slowly release chlorine gas, providing its pungent odor.

183. (4) Sodium benzoate
Sodium benzoate is a widely used food preservative, particularly in acidic products like fruit juices, carbonated drinks, jams, and pickles. It works by inhibiting the growth of potentially harmful bacteria, yeasts, and molds. By maintaining a low pH environment, it effectively extends the shelf life of processed foods while preserving their flavor and safety, making it a staple in food production.

NODIA

184. (1) Artificial sweetening agents
Saccharin and aspartame are popular artificial sweetening agents used as low-calorie alternatives to sucrose, or common table sugar. They are many times sweeter than natural sugar, meaning only tiny amounts are required to achieve the desired level of sweetness. These compounds are particularly useful for individuals with diabetes or those looking to reduce their caloric intake without sacrificing sweet taste in foods.

185. (3) Enhance flavor
Monosodium glutamate, commonly referred to as MSG, is a sodium salt derived from the amino acid glutamic acid. It is added to various packaged and processed foods primarily to enhance their savory, meaty flavor, often described as “umami.” While it occurs naturally in some foods like tomatoes and cheeses, its concentrated form is used by the food industry to intensify the taste.

186. (1) Antiseptics
Antiseptics are chemical substances specifically designed to be applied to living tissues, such as skin or wounds, to kill or inhibit the growth of microorganisms. Unlike disinfectants, which are stronger and used on inanimate objects like floors, antiseptics must be safe enough to prevent infection without causing significant damage to the host’s cells. Common examples include iodine and alcohol solutions.

187. (4) To neutralize the acids produced by bacteria in the mouth
Bacteria in the mouth ferment food particles, particularly sugars, to produce organic acids that can erode tooth enamel and lead to cavities. Toothpastes are formulated to be slightly basic to effectively neutralize these harmful acids. This neutralizing action helps to maintain a healthy pH balance in the oral cavity, protecting the calcium phosphate structure of the teeth and promoting overall dental health.

188. (1) I, II and III only
NPK fertilizers are those that provide one or more of the three primary macronutrients essential for plant growth: nitrogen, phosphorus, and potassium. Urea is a major source of nitrogen, superphosphate provides phosphorus, and potassium chloride, also known as muriate of potash, provides potassium. Sodium chloride, or common salt, is not used as a fertilizer as it does not provide these nutrients.

189. (3) Insecticide
DDT is a potent synthetic organochlorine compound that was once widely used globally as an insecticide in both agriculture and disease control. It was particularly effective in reducing the populations of mosquitoes that carry malaria and lice that spread typhus. However, its long-term environmental persistence and harmful effects on wildlife led to widespread bans or severe restrictions on its use globally.

190. (4) Sodium hydroxide
Most commercial liquid drain cleaners contain a high concentration of sodium hydroxide, also known as caustic soda or lye. This strong base is highly effective at dissolving organic clogs, such as hair, grease, and food particles, through a process of chemical decomposition. Its caustic nature allows it to break down tough blockages quickly, though it must be handled with extreme care.

191. (1) Load force to effort force
The mechanical advantage of a simple machine is a measure of its force-amplifying ability. It is mathematically defined as the ratio of the output force, or load, to the input force, or effort. A mechanical advantage greater than one indicates that the machine allows a user to move a heavy load with relatively less effort, making physical tasks much easier to perform.

192. (2) Class 1 lever
A pair of scissors is a classic example of a Class 1 lever. In this arrangement, the fulcrum or pivot point is located between the effort applied by the fingers at the handles and the load, which is the material being cut by the blades. This configuration allows for a change in the direction of force and can be designed to provide a mechanical advantage.

193. (2) Load is between the Fulcrum and the Effort
In a Class 2 lever, the load is positioned between the fulcrum and the effort. Common examples include wheelbarrows and nutcrackers. Because the effort arm is always longer than the load arm in this configuration, Class 2 levers always provide a mechanical advantage greater than one. This allows the user to lift heavy objects with significantly less force than would be required.

194. (3) IV only
Simple machines are designed to make work easier by multiplying force, increasing speed, or changing the direction of an applied force. However, they cannot multiply work or energy. According to the law of conservation of energy, the output work can never exceed the input work. In fact, due to friction, the useful work output is always slightly less than total energy.

195. (2) Less than 1
In a Class 3 lever, the effort is applied between the fulcrum and the load. Because the effort arm is always shorter than the load arm, the mechanical advantage is consistently less than one. While these machines require more force than the load itself, they are useful because they multiply the distance or speed at which the load moves, as seen in tweezers.

196. (4) To change the direction of the applied effort
A single fixed pulley has a mechanical advantage of approximately one, meaning the effort required is equal to the load. While it doesn't multiply force, its primary practical advantage is changing the direction of the applied effort. This allows a person to pull downward using their body weight to lift a load upward, which is often much easier than lifting directly.

Downloaded from www.pdf.tube

STUDYING FROM PDFs?

THINK AGAIN.

If you are studying only from PDFs,
you are wasting valuable time.

Research shows that learning from

PRINTED BOOKS has up to

4× HIGHER RETENTION

than studying from screens.

PRINT BOOK = BETTER MEMORY

PDF = LOWER RETENTION

Those who study from **PRINTED BOOKS**
move **AHEAD.**

Others are left **BEHIND**
in competition.

In competitive exams,
being average is not enough.

STAY ONE STEP AHEAD.

197. (1) A-iii, B-i, C-iv, D-ii
Simple machines are found in many common objects. A wheelchair ramp is a practical application of an inclined plane. An axe blade functions as a wedge to split wood. A spiral staircase acts as a screw wrapped around a central pillar. A doorknob is a classic example of a wheel and axle system. These devices all serve to manipulate applied force.

198. (2) An inclined plane
A screw is fundamentally an inclined plane that has been wrapped around a central cylinder or shaft in a spiral pattern. The threads of the screw act as the sloping surface. This design converts rotational motion and torque into linear force and displacement. By spreading the effort over a longer distance along the threads, a screw provides a high mechanical advantage.

199. (4) Friction between moving parts
The efficiency of any real-world simple machine is always less than one hundred percent. This is primarily because some of the input energy is always converted into non-useful forms, such as heat and sound, due to friction between moving parts. While lubrication can reduce these losses, friction can never be entirely eliminated, ensuring that output work is always less than input work.

200. (1) A-i, B-ii, C-iii, D-iv
Understanding simple machines requires defining key terms. The fulcrum is the fixed pivot point of a lever. The load represents the weight or resistance to be moved, while the effort is the force applied by the user. The velocity ratio is the distance moved by the effort divided by the distance moved by the load. Together, these terms describe mechanical performance.

NODIA

CHAPTER 02

Computers, Information and Communication Technology

1. Which core electronic component was primarily utilized in the design of first-generation computers?
(1) Transistors
(2) Vacuum tubes
(3) Integrated circuits
(4) Microprocessors
(5) Question not attempted

2. What was the major technological shift that characterized second-generation computers compared to the first generation?
(1) Transistors
(2) Large-scale integration
(3) Artificial intelligence
(4) Optical storage devices
(5) Question not attempted

3. Which of the following is not a characteristic of fourth-generation computers?
(1) Use of Very Large Scale Integration (VLSI) technology
(2) Introduction of microprocessors
(3) Reliance on punch cards for input
(4) Development of personal computers
(5) Question not attempted

4. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A): Third-generation computers were significantly faster and smaller than their predecessors.
Reason (R): Third-generation computers used Integrated Circuits (ICs) which packed multiple transistors onto a single silicon chip.
(1) Both A and R are true and R is the correct explanation of A.
(2) Both A and R are true but R is not the correct explanation of A.
(3) A is true but R is false.
(4) A is false but R is true.
(5) Question not attempted

5. Given below are two statements regarding computer types.
Statement I: Mainframe computers are primarily used for large-scale data processing by enterprises.
Statement II: Supercomputers are specialized for tasks requiring immense mathematical calculations, such as weather forecasting.
Which of the above statement(s) is/are correct?
(1) Statement I is true, Statement II is false
(2) Statement I is false, Statement II is true
(3) Both Statement I and II are true
(4) Both Statement I and II are false
(5) Question not attempted

6. Identify the correct statement regarding India's indigenous supercomputer development.
(1) PARAM 8000 was developed by ISRO in 1991.
(2) PARAM 8000 was developed by C-DAC in 1991.
(3) Pratyush is India's first quantum computer.
(4) PARAM Shivay was built exclusively for agricultural analytics.
(5) Question not attempted

7. Which classification of computers operates on continuous variable data rather than discrete binary data?
(1) Digital computers
(2) Hybrid computers
(3) Quantum computers
(4) Analog computers
(5) Question not attempted

8. Match List I with List II.
List I: (Computer Generations)
A. First Gen

Click Here to Buy book on Amazon

B. Second Gen
C. Third Gen
D. Fourth Gen

List II: (Key Technology)
i. Transistors
ii. Vacuum Tubes
iii. Microprocessors
iv. Integrated Circuits

(1) A-ii, B-i, C-iv, D-iii
(2) A-i, B-ii, C-iii, D-iv
(3) A-ii, B-iv, C-i, D-iii
(4) A-iv, B-iii, C-ii, D-i
(5) Question not attempted

9. Identify the odd one out among the following computer classifications.
(1) Microcomputer
(2) Minicomputer
(3) Analog computer
(4) Mainframe computer
(5) Question not attempted

10. Which pair correctly matches the computer generation with its dominant programming language paradigm?
(1) Second Generation - Assembly languages
(2) First Generation - High-level languages like Java
(3) Third Generation - Machine language only
(4) Fourth Generation - Natural Language Processing
(5) Question not attempted

11. Which component of the Central Processing Unit (CPU) is responsible for directing and coordinating most of the operations in the computer?
(1) Arithmetic Logic Unit (ALU)
(2) Cache Memory
(3) System Bus
(4) Control Unit (CU)
(5) Question not attempted

12. Consider the following statements regarding Random Access Memory (RAM):
I. It is a volatile memory.
II. It directly communicates with the CPU.
III. It permanently stores the BIOS instructions.
Which of the above statement(s) is/are correct?
(1) I and II only
(2) II and III only
(3) I and III only
(4) I, II, and III
(5) Question not attempted

13. Identify the incorrect statement regarding Read-Only Memory (ROM).
(1) ROM retains its contents even when power is turned off.
(2) EEPROM can be erased and reprogrammed using an electrical charge.
(3) Dynamic ROM requires continuous refreshing to maintain data.
(4) Firmware is typically stored in ROM.
(5) Question not attempted

NODIA

14. Which memory type provides the fastest access speed for the CPU during data processing?
(1) Main Memory (RAM)
(2) Solid State Drive (SSD)
(3) Hard Disk Drive (HDD)
(4) Cache Memory
(5) Question not attempted

15. What is the primary effect of adding more RAM to a computer system experiencing high page fault rates?
(1) Reduced virtual memory reliance
(2) Decreased processor clock speed
(3) High storage power consumption
(4) Total system crash prevention
(5) Question not attempted

16. Select the correct order of computer memory hierarchy starting from the fastest access speed to the slowest.
(1) Cache, Registers, RAM, Magnetic Disk
(2) Registers, Cache, RAM, Magnetic Disk
(3) Registers, RAM, Cache, Magnetic Disk
(4) RAM, Cache, Registers, Magnetic Disk
(5) Question not attempted

17. Which fundamental technology differentiates a Solid State Drive (SSD) from a Hard Disk Drive (HDD)?
(1) Integration of rotating magnetic platters
(2) Use of NAND flash memory
(3) Implementation of optical laser reading
(4) Operation as purely volatile storage
(5) Question not attempted

18. Which of the following is an incorrect pair of hardware devices?
(1) Microphone - Output device
(2) Scanner - Input device
(3) Plotter - Output device
(4) Barcode Reader - Input device
(5) Question not attempted

19. What is the primary function of a computer's motherboard?
(1) Provides power to the local area network
(2) Compiles high-level code into machine code
(3) Connects all hardware components
(4) Regulates the CPU temperature during usage
(5) Question not attempted

20. When a computer runs out of physical RAM, which hardware mechanism allows it to temporarily use secondary storage as memory?
(1) Direct Memory Access
(2) Cache Coherence
(3) Flash Memory mapping
(4) Virtual Memory
(5) Question not attempted

21. Which of the following best defines system software?
(1) Performs specific end-user application tasks
(2) Develops high-level web based environments
(3) Manages resources and platforms
(4) Controls external drivers for gaming hardware
(5) Question not attempted

22. Consider the following statements comparing compilers and interpreters:
I. A compiler translates the entire source code into machine code at once.
II. An interpreter translates and executes the code line by line.
III. Compiled programs generally run faster than interpreted ones.
IV. Interpreters consume less memory during translation than compilers.
Which of the above statement(s) is/are correct?
(1) I, II, and III only
(2) II, III, and IV only
(3) I, II, and IV only
(4) I, II, III, and IV
(5) Question not attempted

23. Which of the following is not considered a utility software?
(1) Routine disk defragmenter tool
(2) Standard antivirus protection program
(3) System file backup utility software
(4) Database Management System
(5) Question not attempted

24. Assembly language is classified as which type of programming language?
(1) Low-level language
(2) High-level language
(3) Object-oriented language
(4) Scripting language
(5) Question not attempted

25. Given below are two statements regarding programming paradigms.
Statement I: C++ and Java are examples of Object-Oriented Programming (OOP) languages.
Statement II: OOP utilizes concepts like inheritance, polymorphism, and encapsulation.
Which of the above statement(s) is/are correct?
(1) Both Statement I and II are correct
(2) Statement I is correct, Statement II is incorrect
(3) Statement I is incorrect, Statement II is correct
(4) Both Statement I and II are incorrect
(5) Question not attempted

26. Identify the odd one out among the following terms.
(1) Linux
(2) Python
(3) Java
(4) C++
(5) Question not attempted

27. Match List I with List II.
List I: (Software Type)
A. Operating System
B. Application Software
C. Utility Software
D. Firmware
List II: (Example)
i. BIOS
ii. Microsoft Word
iii. Disk Cleanup
iv. Windows 11

Downloaded from www.pdf.tube

(1) A-iv, B-ii, C-iii, D-i
(2) A-iv, B-iii, C-ii, D-i
(3) A-i, B-ii, C-iii, D-iv
(4) A-ii, B-iv, C-i, D-iii
(5) Question not attempted

28. Which of the following correctly defines firmware?
(1) Frequently updated user application software
(2) Low-level ROM-based hardware control
(3) Malicious software used to steal user data
(4) High-level source code available for public use
(5) Question not attempted

29. If a new printer is connected to a computer but fails to operate, which specific type of system software is most likely missing?
(1) Word processor
(2) Operating system kernel
(3) Device driver
(4) Compiler
(5) Question not attempted

30. What is a primary beneficial effect of adopting open-source software like Linux in enterprise environments?
(1) Mandatory licensing and vendor lock-in fees
(2) Removal of the need for local hardware storage
(3) Total immunity to all security vulnerabilities
(4) Low cost and high customizability
(5) Question not attempted

31. Which of the following is the fundamental function of an Operating System (OS)?
(1) Managing computer hardware and software resources
(2) Generating hardware components
(3) Creating database schemas
(4) Acting as a physical network switch
(5) Question not attempted

32. Consider the following statements about the Linux operating system:
I. It is an open-source operating system.
II. It is based on the Unix OS architecture.
III. Its kernel was originally developed by Linus Torvalds.
IV. It is strictly available only as a Command Line Interface (CLI).
V. Android OS is built on a modified Linux kernel.
Which of the above statement(s) is/are correct?
(1) I, II, III, and V only
(2) I, III, IV, and V only
(3) II, III, IV, and V only
(4) I, II, III, IV, and V
(5) Question not attempted

33. Identify the incorrect statement regarding the Windows operating system.
(1) Windows 10 introduced the Cortana voice assistant.
(2) Windows completely lacks support for multi-threading.
(3) Windows OS is a proprietary software owned by Microsoft.
(4) The NT file system (NTFS) is standard in modern Windows versions.
(5) Question not attempted

34. A computer executing multiple programs simultaneously by rapidly switching the CPU among them is demonstrating which concept?
(1) Multitasking
(2) Multiprocessing
(3) Batch processing
(4) Distributed processing
(5) Question not attempted

35. The Android operating system, predominantly used in mobile devices, is technically based on which core?
(1) Windows NT Kernel
(2) macOS Kernel
(3) Linux Kernel
(4) Symbian Kernel
(5) Question not attempted

36. Given below are the steps in a computer's booting process:
I. OS Kernel loading into RAM
II. Power-On Self Test (POST)
III. BIOS execution
IV. Execution of init/systemd processes
Select the correct chronological arrangement.
(1) II, III, I, IV
(2) III, II, I, IV
(3) II, I, III, IV

NODIA

(4) I, II, III, IV
(5) Question not attempted

37. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A): Open-source operating systems like Linux allow users to view, modify, and distribute the source code.
Reason (R): This transparency makes open-source systems entirely immune to all forms of malware.
(1) Both A and R are true and R is the correct explanation of A.
(2) Both A and R are true but R is not the correct explanation of A.
(3) A is true but R is false.
(4) A is false but R is true.
(5) Question not attempted

38. Which of the following correctly pairs the operating system type with its characteristic?
(1) Real-Time OS - Processes data with no strict time constraints
(2) Batch OS - Groups similar jobs for sequential execution without user interaction
(3) Time-Sharing OS - Dedicates the entire CPU to one single user exclusively
(4) Network OS - Manages solely single-node standalone computers
(5) Question not attempted

39. Which of the following is generally not considered a direct function of an operating system?
(1) Memory management
(2) File management
(3) Process scheduling
(4) Source code compilation
(5) Question not attempted

40. Which interface is most appropriate for users requiring visual metaphors like windows, icons, and menus to interact with the OS?
(1) Graphical User Interface (GUI)
(2) Command Line Interface (CLI)
(3) Batch User Interface
(4) Application Programming Interface (API)
(5) Question not attempted

41. In the binary number system, what does a single "bit" represent?
(1) A sequence of 8 bytes
(2) A single alphanumeric character
(3) A discrete value of either 0 or 1
(4) A hexadecimal value up to 15
(5) Question not attempted

42. How many bits constitute a 'nibble' in data representation?
(1) 2 bits
(2) 4 bits
(3) 8 bits
(4) 16 bits
(5) Question not attempted

43. Given below are two statements regarding character encoding.
Statement I: ASCII is an encoding standard used to represent text in computers.
Statement II: Unicode was developed because ASCII did not have enough capacity to represent characters of all world languages.
Which of the above statement(s) is/are correct?
(1) Both Statement I and II are correct
(2) Statement I is correct, Statement II is incorrect
(3) Statement I is incorrect, Statement II is correct
(4) Both Statement I and II are incorrect
(5) Question not attempted

44. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A): The binary number system uses base 2.
Reason (R): Digital computer circuits are constructed using electronic switches that can only exist in two states: on or off.
(1) Both A and R are true and R is the correct explanation of A.
(2) Both A and R are true but R is not the correct explanation of A.
(3) A is true but R is false.
(4) A is false but R is true.
(5) Question not attempted

45. Why is the hexadecimal system frequently used in computer science alongside binary?
(1) It operates faster in the CPU logic gates than

Click Here to Buy book on Amazon

binary.
(2) It represents data using 20 distinct symbols.
(3) Human-friendly shorthand for binary
(4) It entirely eliminates the need for RAM in modern PCs.
(5) Question not attempted

46. Identify the incorrect statement regarding computer data storage units.
(1) One Byte equals 8 bits.
(2) One Kilobyte (KB) equals 1024 Bytes.
(3) One Terabyte (TB) equals 1024 Gigabytes (GB).
(4) One Megabyte (MB) equals 1024 Gigabytes (GB).
(5) Question not attempted

47. What is the binary equivalent of the decimal number 13?
(1) 1101
(2) 1011
(3) 1110
(4) 1001
(5) Question not attempted

48. Match List I with List II.
List I: (Unit)
A. Kilobyte
B. Megabyte
C. Gigabyte
D. Terabyte
List II: (Value in Bytes)
i. 2^{20} bytes
ii. 2^{10} bytes
iii. 2^{40} bytes
iv. 2^{30} bytes
(1) A-ii, B-i, C-iv, D-iii
(2) A-i, B-ii, C-iii, D-iv
(3) A-ii, B-iv, C-i, D-iii
(4) A-iv, B-iii, C-ii, D-i
(5) Question not attempted

49. Identify the odd one out among the numerical systems used in computing.
(1) Binary
(2) Algorithmic
(3) Octal
(4) Hexadecimal
(5) Question not attempted

50. Which pair represents correct character encoding schemes used in computing?
(1) ASCII and EBCDIC
(2) TCP and UDP
(3) HTTP and FTP
(4) FAT32 and NTFS
(5) Question not attempted

51. Which type of network is specifically designed to cover a large geographic area, such as a country or continent?
(1) Local Area Network (LAN)
(2) Metropolitan Area Network (MAN)
(3) Wide Area Network (WAN)
(4) Personal Area Network (PAN)
(5) Question not attempted

52. Consider the following statements regarding network topologies:
I. Star topology relies on a central hub or switch.
II. Bus topology uses a single central backbone cable.
III. Ring topology connects each device to exactly one other device in a line.
Which of the above statement(s) is/are correct?
(1) I and II only
(2) II and III only
(3) I and III only
(4) I, II, and III
(5) Question not attempted

53. Identify the incorrect statement regarding Virtual Private Networks (VPNs).
(1) VPNs establish a secure, encrypted connection over the public internet.
(2) VPNs can mask the user's IP address.
(3) VPNs eliminate the need for an Internet Service Provider (ISP).
(4) VPNs are commonly used for secure remote work access.
(5) Question not attempted

54. An organization sets up a restricted network accessible only to its employees and selected external partners like suppliers. This is an application of which concept?
(1) Internet
(2) Extranet
(3) Usenet
(4) Darknet

Downloaded from www.pdf.tube

(5) Question not attempted

55. What is the fundamental difference between a MAC address and an IP address?
(1) Variable network identifier vs physical hardware bound
(2) Exclusive WAN protocols vs internal LAN addressing
(3) Synonymous networking terms for identifying devices
(4) Physical hardware address vs logical network address
(5) Question not attempted

56. Which of the following is not a networking device?
(1) Compiler
(2) Switch
(3) Router
(4) Bridge
(5) Question not attempted

57. Which statement correctly describes fiber optic cables in network transmission?
(1) Use of electrical pulses through copper wires
(2) High susceptibility to electromagnetic interference
(3) Pulses of light through glass or plastic
(4) Low bandwidth support in traditional networking
(5) Question not attempted

58. Identify the correct match between the network device and its primary function.
(1) Switch - Forwards packets to a specific device using MAC addresses
(2) Hub - Filters traffic by IP address
(3) Router - Connects devices within a single identical LAN segment only
(4) Modem - Acts as a firewall against malware
(5) Question not attempted

59. Given below are two statements regarding network architecture.
Statement I: In a client-server architecture, multiple client machines request services or resources from a central server.
Statement II: Peer-to-peer (P2P) architecture lacks a dedicated central server, and all nodes share resources equally.
Which of the above statement(s) is/are correct?
(1) Both Statement I and II are correct
(2) Statement I is correct, Statement II is incorrect
(3) Statement I is incorrect, Statement II is correct
(4) Both Statement I and II are incorrect
(5) Question not attempted

60. What is a direct effect of severe network congestion on a packet-switched network like the internet?
(1) Increased transmission speed due to packet compression
(2) Packet loss and increased latency (delay)
(3) Automatic conversion of the network into a circuit-switched network
(4) Complete physical hardware failure of endpoint devices
(5) Question not attempted

61. The standard suite of protocols responsible for communication across the Internet is known as:
(1) OSI Model
(2) SMTP/POP3
(3) TCP/IP
(4) IEEE 802.11
(5) Question not attempted

62. Consider the following statements regarding HTTP and HTTPS:
I. HTTP stands for Hypertext Transfer Protocol.
II. HTTPS encrypts data transferred between the browser and the website.
III. HTTP operates by default on port 80.
IV. HTTPS relies on SSL/TLS certificates for security.
Which of the above statement(s) is/are correct?
(1) I, II, and III only
(2) II, III, and IV only
(3) I, III, and IV only
(4) I, II, III, and IV
(5) Question not attempted

NODIA

63. Identify the incorrect statement regarding the Domain Name System (DNS).
(1) It encrypts email attachments for secure transmission.
(2) It translates human-readable domain names into IP addresses.

(3) It acts as the directory or phonebook of the Internet.
(4) Without DNS, users would have to memorize numerical IP addresses to visit websites.
(5) Question not attempted

64. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A): The transition from IPv4 to IPv6 was mandated on the internet.
Reason (R): IPv4 uses 32-bit addresses and the global supply of available IPv4 addresses was exhausted.
(1) Both A and R are true and R is the correct explanation of A.
(2) Both A and R are true but R is not the correct explanation of A.
(3) A is true but R is false.
(4) A is false but R is true.
(5) Question not attempted

65. What is the primary role of an Internet Service Provider (ISP)?
(1) To manufacture networking routers
(2) To provide users and organizations with access to the internet
(3) To write the source code for web browsers
(4) To act as a central server for all blockchain transactions
(5) Question not attempted

66. Which of the following is a correct pair of an internet protocol and its primary use?
(1) POP3 - Receiving Emails
(2) SMTP - File Transfer
(3) FTP - Sending Emails
(4) HTTP - Assigning IP addresses dynamically
(5) Question not attempted

67. Which transmission technique is most appropriate to describe how data travels across the Internet?
(1) Circuit switching
(2) Message switching
(3) Packet switching
(4) Optical switching
(5) Question not attempted

68. Match List I with List II.
List I: (Acronym)
A. TCP
B. IP
C. HTTP
D. FTP
List II: (Meaning in Networking)
i. Internet Protocol
ii. File Transfer Protocol
iii. Transmission Control Protocol
iv. Hypertext Transfer Protocol
(1) A-iii, B-i, C-iv, D-ii
(2) A-i, B-iii, C-ii, D-iv
(3) A-iii, B-i, C-ii, D-iv
(4) A-ii, B-iv, C-i, D-iii
(5) Question not attempted

69. Which of the following is not a standard protocol associated with Internet operations?
(1) TCP
(2) UDP
(3) BIOS
(4) ICMP
(5) Question not attempted

70. Given below are two statements regarding URLs.
Statement I: A URL (Uniform Resource Locator) specifies the location of a web resource and the mechanism to retrieve it.
Statement II: A standard URL consists of a protocol, domain name, and sometimes a specific file path.
Which of the above statement(s) is/are correct?
(1) Both Statement I and II are correct
(2) Statement I is correct, Statement II is incorrect
(3) Statement I is incorrect, Statement II is correct
(4) Both Statement I and II are incorrect
(5) Question not attempted

71. How does the World Wide Web (WWW) fundamentally differ from the Internet?
(1) Concepts that are exactly the same thing
(2) Physical network consisting of web pages
(3) System operating solely on mobile data
(4) Platform built upon the global network
(5) Question not attempted

72. Consider the following components related to search engines:
I. Web Crawler (Spider)
II. Indexer

Click Here to Buy book on Amazon

III. Search Algorithm
IV. User Interface
V. Web Hosting Server
Which of the above components are primarily responsible for discovering, cataloging, and ranking web pages in a search engine's core operations?
(1) I, II, and III only
(2) I, II, III, and IV only
(3) II, III, IV, and V only
(4) I, II, and V only
(5) Question not attempted

73. Identify the incorrect statement regarding web browsers.
(1) They are application software used to access the World Wide Web.
(2) Google Chrome, Mozilla Firefox, and Apple Safari are examples of web browsers.
(3) Web browsers host the websites they display on local hard drives.
(4) They render HTML documents into visual web pages.
(5) Question not attempted

74. When a user repeatedly visits a website and finds that their login credentials and site preferences are remembered, which web technology is primarily at play?
(1) Cookies
(2) HTML tags
(3) Domain Name System
(4) Hyperlinks
(5) Question not attempted

75. Who is globally recognized as the inventor of the World Wide Web (WWW) and the HTML markup language?
(1) Alan Turing
(2) Bill Gates
(3) Vint Cerf
(4) Tim Berners-Lee
(5) Question not attempted

76. Identify the odd one out among the following Internet entities.
(1) Google
(2) Mozilla Firefox
(3) Bing
(4) DuckDuckGo
(5) Question not attempted

77. Which statement correctly distinguishes the Deep Web from the Dark Web?
(1) Indexed search content vs hidden networks
(2) Illegal access systems vs social platforms
(3) Special software access vs non-indexed data
(4) Strictly identical terms for all web data
(5) Question not attempted

78. Given below are two statements regarding web evolution.
Statement I: Web 1.0 was characterized by static, read-only web pages.
Statement II: Web 2.0 introduced interactivity, user-generated content, and social media platforms.
Which of the above statement(s) is/are correct?
(1) Both Statement I and II are correct
(2) Statement I is correct, Statement II is incorrect
(3) Statement I is incorrect, Statement II is correct
(4) Both Statement I and II are incorrect
(5) Question not attempted

79. Which of the following is not a core component or standard technology of the World Wide Web?
(1) MAC Addressing
(2) HTML
(3) HTTP
(4) URL
(5) Question not attempted

80. What is the intended effect of applying Search Engine Optimization (SEO) strategies to a website?
(1) Completely hide a website from web crawlers
(2) Increase visibility and ranking in results
(3) Convert a website into a blockchain application
(4) Encrypt a database against external threats
(5) Question not attempted

NODIA

81. Which type of malware masks itself as a legitimate program or benign file to trick users into installing it?
(1) Computer Worm
(2) Trojan Horse
(3) Spyware
(4) Adware
(5) Question not attempted

82. Which of the following correctly pairs the cybersecurity concept with its definition?
(1) Spoofing - Masquerading as a trusted entity to intercept data
(2) Phishing - Overwhelming a server with traffic to crash it
(3) Keylogger - Encrypting user data and demanding a ransom
(4) Ransomware - Secretly recording keystrokes typed by a user
(5) Question not attempted

83. Identify the incorrect statement regarding network firewalls.
(1) Firewalls monitor and control incoming and outgoing network traffic.
(2) They can be implemented in both hardware and software.
(3) A firewall completely guarantees that a network can never be hacked.
(4) They establish a barrier between a trusted internal network and untrusted external networks.
(5) Question not attempted

84. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A): Asymmetric encryption uses two different keys for encrypting and decrypting data.
Reason (R): The public key encrypts the data, and only the corresponding private key can decrypt it, enhancing secure data transmission.
(1) Both A and R are true and R is the correct explanation of A.
(2) Both A and R are true but R is not the correct explanation of A.
(3) A is true but R is false.
(4) A is false but R is true.
(5) Question not attempted

85. What specific type of malicious software encrypts a victim's files and demands payment for the decryption key?
(1) Spyware
(2) Rootkit
(3) Ransomware
(4) Botnet
(5) Question not attempted

86. A website becomes entirely inaccessible after being flooded with massive amounts of fraudulent traffic from multiple compromised devices. This describes which type of attack?
(1) SQL Injection
(2) Distributed Denial of Service (DDoS)
(3) Man-in-the-Middle (MitM)
(4) Cross-Site Scripting (XSS)
(5) Question not attempted

87. Which of the following is not considered a biometric security measure?
(1) Fingerprint scanning
(2) Retina scanning
(3) Facial recognition
(4) Complex password generation
(5) Question not attempted

88. Match List I with List II.
List I: (Cyber Threat)
A. Worm
B. Spyware
C. Phishing
D. SQL Injection
List II: (Description)
i. Fraudulent emails seeking sensitive data
ii. Self-replicating malware requiring no host file
iii. Malicious code inserted into a database query
iv. Software that secretly monitors user activity
(1) A-ii, B-iv, C-i, D-iii
(2) A-i, B-ii, C-iii, D-iv
(3) A-ii, B-iii, C-iv, D-i
(4) A-iv, B-i, C-ii, D-iii
(5) Question not attempted

89. Given below are two statements regarding digital authentication.
Statement I: A digital signature provides authenticity and non-repudiation of an electronic document.
Statement II: Digital signatures rely on hash functions and public key cryptography.
Which of the above statement(s) is/are correct?
(1) Both Statement I and II are correct
(2) Statement I is correct, Statement II is incorrect
(3) Statement I is incorrect, Statement II is correct
(4) Both Statement I and II are incorrect

Downloaded from www.pdf.tube

(5) Question not attempted

90. Which method is most appropriate for significantly securing online accounts beyond just a strong password?
(1) Using Two-Factor Authentication (2FA)
(2) Changing the IP address frequently
(3) Disabling cookies in the browser
(4) Utilizing a public Wi-Fi network
(5) Question not attempted

91. What is the fundamental concept of Cloud Computing?
(1) Storing all local data on physical hard drives offline
(2) Creating decentralized blockchains for secure transactions
(3) Developing atmospheric models for weather forecasting
(4) Internet-based computing services
(5) Question not attempted

92. Consider the following cloud computing service models:
I. SaaS (Software as a Service) delivers complete applications over the web.
II. PaaS (Platform as a Service) provides a framework for developers to build applications.
III. IaaS (Infrastructure as a Service) offers virtualized computing resources over the internet.
Which of the above statement(s) is/are correct?
(1) I and II only
(2) II and III only
(3) I and III only
(4) I, II, and III
(5) Question not attempted

93. Identify the incorrect statement distinguishing Public and Private clouds.
(1) Public clouds share resources among multiple customers (multi-tenancy).
(2) Private clouds are maintained on a private network for a single organization.
(3) Public clouds generally require organizations to purchase and maintain their own server hardware.
(4) A Hybrid cloud combines both public and private cloud models.
(5) Question not attempted

94. The Government of Rajasthan utilizes "RajMegh" to host various e-governance applications securely while using commercial cloud services for non-sensitive public data. This architecture is an example of:
(1) Purely Public Cloud
(2) Community Cloud
(3) Personal Cloud
(4) Hybrid Cloud
(5) Question not attempted

95. What technological concept aims to bring computation and data storage closer to the location where it is needed, to improve response times and save bandwidth, distinct from traditional centralized cloud computing?
(1) Edge Computing
(2) Serverless Computing
(3) Quantum Computing
(4) Mainframe Computing
(5) Question not attempted

96. Select the correct order of cloud service models from the highest level of provider management (least user control) to the lowest level of provider management (most user control).
(1) IaaS, PaaS, SaaS
(2) SaaS, PaaS, IaaS
(3) PaaS, SaaS, IaaS
(4) SaaS, IaaS, PaaS
(5) Question not attempted

NODIA

97. Identify the odd one out among these major Cloud Computing service providers.
(1) Amazon Web Services (AWS)
(2) Microsoft Excel
(3) Microsoft Azure
(4) Google Cloud Platform (GCP)
(5) Question not attempted

98. Which core technology serves as the foundation for cloud computing, allowing multiple virtual instances to run on a single physical machine?
(1) Virtualization
(2) Encapsulation
(3) Containerization
(4) Standardization
(5) Question not attempted

99. Which of the following is not a recognized characteristic of Cloud Computing according to standard definitions?
(1) On-demand self-service
(2) Rapid elasticity
(3) Mandatory localized hardware maintenance
(4) Broad network access
(5) Question not attempted

100. What is a primary beneficial effect of cloud computing's scalability for a growing startup?
(1) Mandatory multi-year server purchasing
(2) Total loss of regional data privacy
(3) Single operating system software lock
(4) Dynamic resource scaling capability
(5) Question not attempted

101. Which statement accurately defines the relationship between Artificial Intelligence (AI), Machine Learning (ML), and Deep Learning (DL)?
(1) They are three unrelated disciplines.
(2) ML is the broadest concept, containing AI, which contains DL.
(3) AI is the overarching concept, ML is a subset of AI, and DL is a specialized subset of ML.
(4) DL was developed first, followed by ML, and finally AI.
(5) Question not attempted

102. Consider the following types of Machine Learning:
I. Supervised learning uses labeled datasets to train algorithms.
II. Unsupervised learning looks for undetected patterns in unlabeled data.
III. Reinforcement learning trains algorithms via a reward and punishment mechanism.
IV. Deep learning strictly avoids the use of artificial neural networks.
Which of the above statement(s) is/are correct?
(1) I, II, and III only
(2) II, III, and IV only
(3) I, III, and IV only
(4) I, II, III, and IV
(5) Question not attempted

103. Identify the incorrect statement regarding Artificial Neural Networks.
(1) They are computational models inspired by the human brain.
(2) They consist of input, hidden, and output layers.
(3) Deep Learning specifically utilizes neural networks with multiple hidden layers.
(4) They cannot be used for pattern recognition or image processing.
(5) Question not attempted

104. Virtual assistants like Siri, Alexa, and chatbots that understand and respond to human language primarily rely on which branch of AI?
(1) Natural Language Processing (NLP)
(2) Robotics
(3) Computer Vision
(4) Swarm Intelligence
(5) Question not attempted

105. What is the fundamental purpose of the Turing Test proposed by Alan Turing in 1950?
(1) To test the processing speed of a microchip
(2) To check the cryptographic strength of a cipher
(3) Measure human-like machine intelligence
(4) To ensure robots do not harm human beings
(5) Question not attempted

106. Which pair correctly links an AI domain with its practical application?
(1) Computer Vision - Facial recognition systems
(2) Natural Language Processing - Autonomous driving sensors
(3) Reinforcement Learning - Simple spell checking
(4) Expert Systems - Raw video rendering
(5) Question not attempted

107. Given below are two statements regarding generative models.
Statement I: Generative AI refers to algorithms capable of creating new text, images, or audio based on training data.
Statement II: ChatGPT and DALL-E are examples of Generative AI models.
Which of the above statement(s) is/are correct?
(1) Both Statement I and II are correct
(2) Statement I is correct, Statement II is incorrect
(3) Statement I is incorrect, Statement II is correct
(4) Both Statement I and II are incorrect

Click Here to Buy book on Amazon

(5) Question not attempted

108. Match List I with List II.
List I: (AI Term)
A. Algorithm
B. Dataset
C. Training
D. Inference
List II: (Definition)
i. The collection of data used to teach an AI
ii. The process of an AI applying learned knowledge to new data
iii. A set of rules or instructions given to an AI
iv. The phase where an AI learns patterns from data
(1) A-iii, B-i, C-iv, D-ii
(2) A-i, B-iii, C-ii, D-iv
(3) A-iv, B-ii, C-i, D-iii
(4) A-ii, B-iv, C-iii, D-i
(5) Question not attempted

109. Which of the following fields is not traditionally considered a subset or core component of Artificial Intelligence?
(1) Machine Learning
(2) Robotics
(3) Relational Database Normalization
(4) Natural Language Processing
(5) Question not attempted

110. Which type of AI system is most appropriate for replicating the decision-making ability of a human specialist in a specific domain, such as medical diagnosis?
(1) Generative Adversarial Networks (GANs)
(2) Chatbots
(3) Swarm robots
(4) Expert Systems
(5) Question not attempted

111. In the context of Big Data, the term "Volume" refers to:
(1) Data size and storage magnitude
(2) Speed of data generation systems
(3) Verifiable data trustworthiness levels
(4) Multiple data formats and types
(5) Question not attempted

112. Consider the 5Vs of Big Data:
I. Volume describes data magnitude.
II. Velocity refers to the speed of data processing and generation.
III. Variety indicates the different types of structured and unstructured data.
IV. Veracity reflects the quality, accuracy, and reliability of the data.
V. Value represents the actionable insights gained from the data.
Which of the above statement(s) is/are correct?
(1) I, II, and III only
(2) I, III, IV, and V only
(3) II, III, and V only
(4) I, II, III, IV, and V
(5) Question not attempted

NODIA

113. Identify the incorrect statement regarding data types in Big Data.
(1) Relational databases primarily store structured data.
(2) Big Data analytics is solely concerned with analyzing highly structured tabular data.
(3) Unstructured data includes emails, videos, and social media posts.
(4) Semi-structured data includes formats like JSON and XML.
(5) Question not attempted

114. A hospital system analyzes millions of patient records to predict potential disease outbreaks before they occur. This is an application of:
(1) Big Data Predictive Analytics
(2) Web Hosting
(3) Cryptocurrency mining
(4) Basic data entry
(5) Question not attempted

115. Which open-source software framework is traditionally most associated with the distributed storage and processing of massive Big Data sets?
(1) WordPress
(2) Mozilla Firefox
(3) Apache Hadoop
(4) Linux Kernel
(5) Question not attempted

116. Select the correct order of the Data Analytics Maturity Model, progressing from basic hindsight to advanced foresight and optimization.
(1) Predictive, Prescriptive, Descriptive, Diagnostic
(2) Diagnostic, Descriptive, Prescriptive, Predictive

(3) Prescriptive, Predictive, Diagnostic, Descriptive
(4) Descriptive, Diagnostic, Predictive, Prescriptive
(5) Question not attempted

117. Identify the odd one out among the characteristics commonly known as the "V's" of Big Data.
(1) Velocity
(2) Variety
(3) Virtualization
(4) Veracity
(5) Question not attempted

118. Which statement best defines "Data Mining"?
(1) Physical silicon extraction processes
(2) Discovery of patterns in large sets
(3) Legal deletion of user credentials
(4) Physical tape drive backup methods
(5) Question not attempted

119. Which of the following is not a technology or tool typically used for handling Big Data?
(1) Apache Spark
(2) NoSQL databases (e.g., MongoDB)
(3) Hadoop Distributed File System (HDFS)
(4) Microsoft Paint
(5) Question not attempted

120. What is a direct organizational effect of utilizing predictive analytics in business operations?
(1) Forecasting trends and behaviors
(2) Decelerated decision processing
(3) Total historical data erasure
(4) Automated physical goods production
(5) Question not attempted

121. The core concept of Blockchain technology is best described as:
(1) Centralized database management
(2) High-speed local area networking
(3) Distributed, decentralized, public ledger
(4) Digital avatar reality platforms
(5) Question not attempted

122. Which pair correctly links a blockchain mechanism to its purpose?
(1) Cryptographic Hash Function - Ensuring data immutability and linking blocks
(2) Consensus Algorithm - Encrypting user passwords only
(3) Digital Wallet - Mining new blocks
(4) Genesis Block - The final block in a chain
(5) Question not attempted

123. Identify the incorrect statement regarding the "immutability" of a blockchain.
(1) Once data is recorded in a block, it is exceptionally difficult to alter retroactively.
(2) Changing a block requires altering all subsequent blocks in the chain.
(3) It provides a high level of security against fraud and unauthorized changes.
(4) Immutability means any user can easily edit past transactions if they make a mistake.
(5) Question not attempted

NODIA

124. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A): Blockchain technology can significantly reduce the need for intermediaries like banks in financial transactions.
Reason (R): Blockchain uses cryptographic proof and decentralized consensus to establish trust directly between transacting parties.
(1) Both A and R are true and R is the correct explanation of A.
(2) Both A and R are true but R is not the correct explanation of A.
(3) A is true but R is false.
(4) A is false but R is true.
(5) Question not attempted

125. In blockchain terminology, what is the very first block of a blockchain network called?
(1) Alpha Block
(2) Origin Block
(3) Genesis Block
(4) Seed Block
(5) Question not attempted

126. Self-executing digital contracts where the terms of the agreement are directly written into lines of code on a blockchain are known as:
(1) Legal tokens
(2) Proof of Stake
(3) Decentralized apps (dApps)
(4) Smart contracts
(5) Question not attempted

127. Given below are two statements regarding blockchain access.
Statement I: A public blockchain is completely open and anyone can join and participate in the network.
Statement II: A private blockchain restricts participation and is typically controlled by a single organization.
Which of the above statement(s) is/are correct?
(1) Both Statement I and II are correct
(2) Statement I is correct, Statement II is incorrect
(3) Statement I is incorrect, Statement II is correct
(4) Both Statement I and II are incorrect
(5) Question not attempted

128. Match List I with List II.
List I: (Blockchain Concept)
A. Node
B. Miner
C. Token
D. Ledger
List II: (Description)
i. A digital representation of value or an asset
ii. A participant who validates and adds new blocks
iii. A record-keeping book of transactions
iv. A computer connected to the blockchain network
(1) A-iv, B-ii, C-i, D-iii
(2) A-i, B-iii, C-iv, D-ii
(3) A-iv, B-iii, C-ii, D-i
(4) A-ii, B-i, C-iii, D-iv
(5) Question not attempted

129. Which of the following is not a recognized practical application of Blockchain technology?
(1) Supply chain tracking
(2) Compiling C++ code into machine language
(3) Cryptocurrency systems
(4) Secure electronic voting systems
(5) Question not attempted

130. Which consensus mechanism is most appropriate for describing the original Bitcoin network where miners compete to solve complex mathematical puzzles?
(1) Proof of Work (PoW)
(2) Proof of Stake (PoS)
(3) Delegated Proof of Stake (DPoS)
(4) Practical Byzantine Fault Tolerance (PBFT)
(5) Question not attempted

131. The "Internet of Things" (IoT) fundamentally refers to:
(1) Social platforms for mobile use
(2) Global continental physical cables
(3) Network of objects with sensors
(4) Gaming based virtual environments
(5) Question not attempted

132. Consider the following components of an IoT architecture:
I. Sensors/Devices that collect data.
II. Connectivity protocols (like Wi-Fi, Bluetooth) to transmit data.
III. Cloud/Data Processing centers that analyze the collected data.
Which of the above statement(s) is/are correct for a standard IoT system to function?
(1) I and II only
(2) II and III only
(3) I and III only
(4) I, II, and III
(5) Question not attempted

133. Identify the incorrect statement regarding IoT security challenges.
(1) Many IoT devices lack basic security features like strong default passwords.
(2) The sheer volume of IoT devices increases the attack surface for hackers.
(3) IoT devices cannot be compromised to form botnets for DDoS attacks.
(4) Data privacy is a major concern due to continuous data collection by smart devices.
(5) Question not attempted

134. A user sets their thermostat to automatically lower the temperature when their smartphone GPS indicates they have left the house. This is a practical application of:
(1) Blockchain smart contracts
(2) Smart Home IoT automation
(3) Quantum cryptography
(4) Industrial Internet of Things (IIoT)
(5) Question not attempted

135. Which early technology paved the way for modern IoT by allowing items to be tracked

Downloaded from www.pdf.tube

wirelessly using electromagnetic fields to identify tags?
(1) HTML (Hypertext Markup Language)
(2) HTTPS
(3) XML
(4) RFID (Radio Frequency Identification)
(5) Question not attempted

136. Which statement accurately describes the Industrial Internet of Things (IIoT)?
(1) Enhancement of industrial processes
(2) Exclusive focus on consumer watches
(3) Online retail of internet devices
(4) Theoretical network connectivity concept
(5) Question not attempted

137. Identify the odd one out among these communication protocols.
(1) MQTT
(2) CoAP
(3) HDMI
(4) Zigbee
(5) Question not attempted

138. Given below are two statements regarding IoT components.
Statement I: In IoT, sensors are used to collect data from the environment (e.g., temperature).
Statement II: Actuators are used to perform a physical action based on the data (e.g., turning on a motor).
Which of the above statement(s) is/are correct?
(1) Both Statement I and II are correct
(2) Statement I is correct, Statement II is incorrect
(3) Statement I is incorrect, Statement II is correct
(4) Both Statement I and II are incorrect
(5) Question not attempted

139. Which of the following is not directly a functional component required for an IoT device to operate?
(1) Sensors
(2) Network connectivity
(3) Processing unit / Microcontroller
(4) Mechanical punch cards
(5) Question not attempted

140. What was a major structural effect on network infrastructure driven by the rapid proliferation of IoT devices?
(1) Abandonment of wireless networking
(2) Adoption of the IPv6 protocol
(3) Reduction in global data generation
(4) Use of traditional copper cabling
(5) Question not attempted

141. The evolution from 1G to 2G in mobile technology was primarily marked by the transition from:
(1) Digital signals to analog signals
(2) Voice calls to high-speed video streaming
(3) Analog signals to digital signals
(4) Mobile networks to satellite networks
(5) Question not attempted

142. Consider the following features promoted in 5G technology:
I. Significantly lower latency compared to 4G.
II. Higher data transfer speeds (multi-Gbps peak rates).
III. Ability to connect a massive density of devices concurrently.
IV. Complete elimination of electromagnetic radiation.
Which of the above statement(s) is/are correct?
(1) I, II, and III only
(2) II, III, and IV only
(3) I, III, and IV only
(4) I, II, III, and IV
(5) Question not attempted

143. Identify the incorrect statement comparing 4G LTE and VoLTE.
(1) VoLTE heavily decreases voice call quality compared to 2G networks.
(2) 4G LTE was originally designed primarily for data transfer.
(3) VoLTE (Voice over LTE) allows voice calls to be transmitted over the 4G data network.
(4) Under standard 4G without VoLTE, phones must drop to 3G/2G to make voice calls.
(5) Question not attempted

144. In 5G technology, the concept of dividing a single physical network into multiple virtual networks optimized for different specific uses (e.g., autonomous driving vs. smart meters) is known as:

NODIA

(1) Packet Switching
(2) Network Slicing
(3) Frequency Hopping
(4) Carrier Aggregation
(5) Question not attempted

145. GSM and CDMA are dominant standards associated primarily with which era of mobile network generations?
(1) 1G
(2) 2G and 3G
(3) 4G exclusively
(4) 5G
(5) Question not attempted

146. Which pair correctly matches the mobile network generation with its hallmark technological capability?
(1) 3G - Introduction of mobile web browsing and data services
(2) 1G - SMS text messaging
(3) 2G - Mobile broadband and video calling
(4) 4G - Analog voice calls
(5) Question not attempted

147. Given below are two statements regarding 5G technology.
Statement I: Massive MIMO (Multiple Input, Multiple Output) is a key technology used in 5G.
Statement II: Massive MIMO uses a large number of antennas at the base station to increase network capacity and efficiency.
Which of the above statement(s) is/are correct?
(1) Both Statement I and II are correct
(2) Statement I is correct, Statement II is incorrect
(3) Statement I is incorrect, Statement II is correct
(4) Both Statement I and II are incorrect
(5) Question not attempted

148. Match List I with List II.
List I: (Mobile Generation)
A. 1G
B. 2G
C. 3G
D. 4G
List II: (Key Feature)
i. Digital voice and SMS
ii. High-speed IP-based network (LTE)
iii. Analog voice
iv. Mobile broadband and apps
(1) A-iii, B-i, C-iv, D-ii
(2) A-i, B-ii, C-iii, D-iv
(3) A-iii, B-iv, C-i, D-ii
(4) A-iv, B-i, C-ii, D-iii
(5) Question not attempted

149. Which of the following is not typically cited as a primary use-case requiring the advanced capabilities of 5G technology?
(1) Real-time remote robotic surgery
(2) Autonomous vehicle communication (V2X)
(3) Sending basic text-only emails
(4) High-definition augmented reality (AR) streaming
(5) Question not attempted

150. What does the term "latency" most appropriately refer to in the context of 5G networks?
(1) Monthly data volume limit
(2) Signal response time delay
(3) Physical handset dimensions
(4) Military frequency reserve
(5) Question not attempted

151. What does the acronym UPI stand for in India's digital payment ecosystem?
(1) Universal Payment Interface
(2) Unique Payment Identity
(3) Uninterrupted Processing Interface
(4) Unified Payments Interface
(5) Question not attempted

152. Consider the following statements regarding NEFT and RTGS in India:
I. NEFT operates in half-hourly batches.
II. RTGS processes transactions continuously in real-time.
III. Both systems are available 24x7x365.
IV. RTGS has a minimum transfer limit of ₹2 lakh.
V. NEFT has a minimum transfer limit of ₹2 lakh.
Which of the above statement(s) is/are correct?
(1) I, II, III, and IV only
(2) I, III, IV, and V only
(3) II, III, IV, and V only
(4) I, II, III, and V only
(5) Question not attempted

Click Here to Buy book on Amazon

153. Identify the incorrect statement comparing IMPS and NEFT.
(1) Both IMPS and NEFT are available 24x7.
(2) IMPS provides instant real-time settlement of funds.
(3) IMPS is managed by the RBI, whereas NEFT is managed exclusively by private banks.
(4) NEFT settles transactions in batches, not instantly.
(5) Question not attempted

154. The Government of India introduced a cashless and contactless instrument for digital payment that operates as a prepaid e-voucher delivered via SMS or QR code. What is this called?
(1) e-RUPI
(2) Digital Rupee (CBDC)
(3) BHIM
(4) FASTag
(5) Question not attempted

155. Which umbrella organization operates retail payments and settlement systems in India, including UPI and RuPay?
(1) State Bank of India (SBI)
(2) Ministry of Finance
(3) NITI Aayog
(4) National Payments Corporation of India (NPCI)
(5) Question not attempted

156. Given below are the steps in a typical UPI transaction:
I. Enter UPI PIN
II. Open UPI App and scan QR / enter VPA
III. Bank debits sender and credits receiver
IV. Enter payment amount
Select the correct chronological arrangement.
(1) II, IV, I, III
(2) I, II, IV, III
(3) IV, II, I, III
(4) II, I, IV, III
(5) Question not attempted

157. Identify the odd one out among these digital payment platforms/methods.
(1) Paytm Wallet
(2) Amazon Pay
(3) SWIFT Network
(4) Mobikwik Wallet
(5) Question not attempted

158. Which statement correctly defines a Virtual Payment Address (VPA) in the context of UPI?
(1) Card based digit sequence
(2) Physical bank branch site
(3) RTGS based routing code
(4) Unique account identifier
(5) Question not attempted

159. Which of the following digital payment systems is NOT operated by the National Payments Corporation of India (NPCI)?
(1) NEFT (National Electronic Funds Transfer)
(2) IMPS (Immediate Payment Service)
(3) AePS (Aadhaar Enabled Payment System)
(4) FASTag (National Electronic Toll Collection)
(5) Question not attempted

NODIA

160. What is the effect of the Government of India waiving the Merchant Discount Rate (MDR) on UPI and RuPay debit card transactions?
(1) Penalties for digital use
(2) Zero merchant fees incentive
(3) Automated crypto conversion
(4) Delayed fund settlement time
(5) Question not attempted

161. Which of the following is NOT one of the core vision areas of the Digital India programme?
(1) Digital infrastructure as a utility to every citizen
(2) Mandatory privatization of all telecom networks
(3) Governance and services on demand
(4) Digital empowerment of citizens
(5) Question not attempted

162. Given below are two statements regarding e-governance in Rajasthan.
Statement I: e-Mitra is an ambitious e-governance initiative of the Government of Rajasthan providing various government services under a single roof.
Statement II: e-Mitra services can only be accessed physically at kiosks and have no online web portal.
Which of the above statement(s) is/are correct?
(1) Both Statement I and II are correct
(2) Statement I is correct, Statement II is incorrect
(3) Statement I is incorrect, Statement II is correct

(4) Both Statement I and II are incorrect
(5) Question not attempted

163. Identify the incorrect statement regarding DigiLocker.
(1) It is an initiative under the Digital India program.
(2) It provides secure cloud-based access to authentic digital documents.
(3) Documents in DigiLocker are not legally recognized under the IT Act 2000.
(4) It allows integration with Aadhaar for user authentication.
(5) Question not attempted

164. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A): The implementation of e-office in government departments increases transparency and accountability.
Reason (R): e-office digitizes the movement of files, providing electronic audit trails and reducing processing delays.
(1) Both A and R are true and R is the correct explanation of A.
(2) Both A and R are true but R is not the correct explanation of A.
(3) A is true but R is false.
(4) A is false but R is true.
(5) Question not attempted

165. The UMANG app, developed by the Ministry of Electronics and Information Technology (MeitY), stands for:
(1) Universal Mobile Access for National Governance
(2) Unified Management Application for Network Governance
(3) Unified Mobile Application for New-age Governance
(4) Universal Mechanism for Aadhaar National Governance
(5) Question not attempted

166. A citizen using an online portal to apply for a birth certificate is an example of which e-governance model?
(1) Government to Business (G2B)
(2) Government to Citizen (G2C)
(3) Government to Government (G2G)
(4) Government to Employee (G2E)
(5) Question not attempted

167. Which pair correctly links a Rajasthan specific e-governance initiative with its objective?
(1) RajSampark - Providing free internet to all citizens
(2) RajeGyan - Processing online vehicle registrations
(3) RajKaaj - Public grievance redressal portal
(4) Jan Aadhaar - "One Number, One Card, One Identity" for accessing welfare schemes
(5) Question not attempted

168. Match List I with List II.
List I: (Digital India Initiative)
A. BharatNet
B. e-Hospital
C. SWAYAM
D. e-NAM
List II: (Objective/Feature)
i. Online education platform
ii. Broadband connectivity to Gram Panchayats
iii. National agriculture market portal
iv. Online registration and medical records
(1) A-ii, B-iv, C-i, D-iii
(2) A-i, B-ii, C-iii, D-iv
(3) A-ii, B-i, C-iv, D-iii
(4) A-iv, B-iii, C-ii, D-i
(5) Question not attempted

169. Which of the following is NOT an example of a Government to Citizen (G2C) service?
(1) Online payment of property tax
(2) Applying for a passport online
(3) An inter-departmental memo sent via e-Office
(4) Downloading land records digitally
(5) Question not attempted

170. Which mechanism is most appropriate for describing the direct transfer of subsidies by the government into the bank accounts of beneficiaries to eliminate leakages?
(1) Direct Benefit Transfer (DBT)
(2) Public Distribution System (PDS)
(3) Minimum Support Price (MSP)
(4) Universal Basic Income (UBI)
(5) Question not attempted

Downloaded from www.pdf.tube

171. Twitter (now X) is fundamentally classified under which specific sub-category of social media?
(1) Photo sharing platform
(2) Professional networking
(3) Decentralized autonomous organization
(4) Microblogging
(5) Question not attempted

172. Consider the following statements regarding the impact of social media:
I. It can create "echo chambers" that reinforce existing beliefs.
II. Algorithms often prioritize engaging content, which can sometimes amplify misinformation.
III. It universally enhances the psychological well-being of all users.
Which of the above statement(s) is/are correct?
(1) I and II only
(2) II and III only
(3) I and III only
(4) I, II, and III
(5) Question not attempted

173. Identify the incorrect statement regarding the Information Technology (Intermediary Guidelines and Digital Media Ethics Code) Rules, 2021.
(1) They mandate the appointment of a Chief Compliance Officer for significant social media intermediaries.
(2) They require platforms to trace the "first originator" of information in specific cases related to national security.
(3) They provide absolute immunity to social media platforms regardless of user content.
(4) They establish a grievance redressal mechanism for users.
(5) Question not attempted

174. The phenomenon where content rapidly spreads across social media networks due to high user engagement and algorithmic promotion is known as:
(1) Phishing
(2) Data mining
(3) Cyberbullying
(4) Virality
(5) Question not attempted

NODIA

175. Which Indian regulatory body is primarily responsible for overseeing the content broadcasting regulations for OTT platforms in alignment with the IT Rules 2021?
(1) Ministry of Information and Broadcasting (MIB)
(2) Telecom Regulatory Authority of India (TRAI)
(3) Reserve Bank of India (RBI)
(4) Ministry of Home Affairs
(5) Question not attempted

176. Which statement accurately describes "Deepfakes" in the context of social media?
(1) Text based fake news articles
(2) Synthetic AI based media
(3) Marketing analytical tools
(4) Anonymous trolling accounts
(5) Question not attempted

177. Given below are two statements regarding social media regulations.
Statement I: Under the IT Rules 2021, significant social media intermediaries must have a physical contact address in India.
Statement II: The rules require establishing a three-tier grievance redressal mechanism for digital media.
Which of the above statement(s) is/are correct?
(1) Both Statement I and II are correct
(2) Statement I is correct, Statement II is incorrect
(3) Statement I is incorrect, Statement II is correct
(4) Both Statement I and II are incorrect
(5) Question not attempted

178. Identify the odd one out among these social media or digital platforms.
(1) Oracle Database
(2) Facebook
(3) Instagram
(4) LinkedIn
(5) Question not attempted

179. Under Section 79 of the IT Act, 2000, "Safe Harbor" protection specifically means that:
(1) Intermediaries are liable for all user posts
(2) Platforms must use localized Indian servers
(3) Intermediaries are generally exempt from liability

(4) Government cannot request content removal
(5) Question not attempted

180. What is a recognized psychological effect caused by social media algorithms feeding users information that aligns exclusively with their past behavior and preferences?
(1) The psychological Hawthorne Effect observation
(2) The cognitive Dunning-Kruger Effect theory
(3) A state of mental cognitive dissonance
(4) Confirmation bias or filter bubble effect
(5) Question not attempted

181. What was the primary objective of enacting the Information Technology Act, 2000 in India?
(1) Cryptocurrency usage ban
(2) Telecom network nationalization
(3) Legal recognition of data
(4) Mandatory government social use
(5) Question not attempted

182. Consider the following cybercrimes addressed under the IT Act, 2000 and its amendments:
I. Identity theft (Section 66C)
II. Cheating by personation using computer resource (Section 66D)
III. Violation of privacy (Section 66E)
IV. Cyber terrorism (Section 66F)
Which of the above statement(s) is/are correct?
(1) I, II, and III only
(2) II, III, and IV only
(3) I, III, and IV only
(4) I, II, III, and IV
(5) Question not attempted

183. Identify the incorrect statement regarding Section 66A of the IT Act, 2000.
(1) It dealt with punishment for sending offensive messages through communication services.
(2) It was struck down as unconstitutional by the Supreme Court of India in the Shreya Singhal case (2015).
(3) Critics argued it violated the fundamental right to freedom of speech and expression.
(4) It is currently active and heavily used by law enforcement agencies today.
(5) Question not attempted

184. Under which section of the IT Act, 2000 is compensation for failure to protect sensitive personal data (corporate liability) mandated?
(1) Section 43A
(2) Section 66A
(3) Section 67
(4) Section 69
(5) Question not attempted

185. What is the role of CERT-In (Computer Emergency Response Team - India) as defined under the IT Act?
(1) Electronic visa issuance
(2) Broadband price regulation
(3) National security incident response
(4) Digital property court
(5) Question not attempted

186. Which pair correctly matches the legal concept with its respective provision in the IT Act, 2000?
(1) Punishment for publishing or transmitting obscene material - Section 67
(2) Power to decrypt information for national security - Section 43
(3) Damage to computer system (Hacking penalty) - Section 66F
(4) Establishment of Cyber Appellate Tribunal - Section 66A
(5) Question not attempted

187. Given below are two statements regarding digital legislation in India.
Statement I: The IT Act 2000 amended the Indian Penal Code and the Indian Evidence Act to recognize electronic records.
Statement II: The Digital Personal Data Protection Act, 2023 (DPDP Act) has now overridden certain data protection clauses previously governed loosely under the IT Act.
Which of the above statement(s) is/are correct?
(1) Both Statement I and II are correct
(2) Statement I is correct, Statement II is incorrect
(3) Statement I is incorrect, Statement II is correct
(4) Both Statement I and II are incorrect
(5) Question not attempted

188. Match List I with List II.
List I: (Section of IT Act)
A. Section 43

Click Here to Buy book on Amazon

B. Section 65
C. Section 66B
D. Section 69

List II: (Provision)

i. Tampering with computer source documents
ii. Penalty for damage to computer/computer system
iii. Power to issue directions for interception/ monitoring
iv. Punishment for dishonestly receiving stolen computer resource

(1) A-ii, B-i, C-iv, D-iii
(2) A-i, B-ii, C-iii, D-iv
(3) A-ii, B-iv, C-i, D-iii
(4) A-iv, B-iii, C-ii, D-i
(5) Question not attempted

189. Which of the following traditional offenses is generally NOT addressed or prosecutable under the core provisions of the IT Act, 2000?
(1) Hacking into a bank's server
(2) Publishing child sexual abuse material online
(3) Physical theft of a neighbor's desktop computer hardware from their home
(4) Launching a Denial of Service attack on a government portal
(5) Question not attempted

190. What is the most appropriate legal effect of the IT Act, 2000 on digital signatures?
(1) Strict ban on financial use
(2) Daily renewal requirement
(3) Exclusive judicial access
(4) Legal validity equivalent
(5) Question not attempted

191. How does Augmented Reality (AR) fundamentally differ from Virtual Reality (VR)?
(1) Real-world overlay vs fully immersive environment
(2) Bulky headset requirement vs native web operation
(3) Exclusive audio usage vs video based application
(4) Strictly identical terms for digital environments
(5) Question not attempted

192. Consider the following concepts related to Quantum Computing:

I. Qubits (Quantum bits) can exist in multiple states simultaneously due to superposition.
II. Entanglement allows qubits that are separated by distance to interact instantaneously.
III. Quantum computers perform calculations identically to classical binary computers, just faster.
IV. Quantum computing poses a future threat to current cryptographic standards (like RSA).
V. Decoherence is a major challenge in maintaining quantum states.

Which of the above statement(s) is/are correct?
(1) I, II, IV, and V only
(2) I, II, III, and IV only
(3) II, III, IV, and V only
(4) I, III, IV, and V only
(5) Question not attempted

193. Identify the incorrect statement regarding the "Metaverse."
(1) It is envisioned as a network of 3D virtual worlds focused on social connection.
(2) It is entirely owned and controlled by a single government entity globally.
(3) It often incorporates elements of VR and AR technologies.
(4) Digital economies and virtual assets (like NFTs) are frequently associated with it.
(5) Question not attempted

194. A surgeon uses a specialized headset during an operation that projects real-time 3D MRI scans precisely over the patient's body, and the surgeon can interact with these holograms. This is an application of:
(1) Mixed Reality (MR)
(2) Pure Virtual Reality (VR)
(3) Generative Pre-trained Transformers (GPT)
(4) Quantum Cryptography
(5) Question not attempted

195. In the context of quantum computing, the term "Quantum Supremacy" refers to:
(1) Philosophical superiority
(2) Technology militarization
(3) Beyond classical capability
(4) Specialized qubit systems

Downloaded from www.pdf.tube

(5) Question not attempted

196. The technology that involves constructing a three-dimensional solid object from a digital file by successively adding material layer by layer is known as:
(1) Subtractive manufacturing
(2) Quantum computing
(3) Virtual Reality mapping
(4) 3D Printing (Additive Manufacturing)
(5) Question not attempted

197. Given below are two statements regarding quantum communication.
Statement I: Quantum cryptography relies on the principles of quantum mechanics to secure data.
Statement II: The fundamental property used in Quantum Key Distribution (QKD) is that observing or measuring a quantum state alters it, thus revealing any eavesdropping attempts.
Which of the above statement(s) is/are correct?
(1) Both Statement I and II are correct
(2) Statement I is correct, Statement II is incorrect
(3) Statement I is incorrect, Statement II is correct
(4) Both Statement I and II are incorrect
(5) Question not attempted

198. Which of the following correctly describes a practical application of IoT and AR combined in industrial maintenance?
(1) Purely virtual video gaming
(2) Smart glass sensor overlays
(3) Assembly code acceleration
(4) Anonymous crypto payments
(5) Question not attempted

199. Which of the following is NOT a typical feature or requirement for experiencing true Virtual Reality (VR)?
(1) Immersive 360-degree digital environment
(2) Head-mounted display (HMD)
(3) Motion tracking sensors
(4) Complete sensory visibility of the physical real-world environment
(5) Question not attempted

200. What is a highly anticipated effect of mature quantum computing on current global cybersecurity infrastructure?
(1) Asymmetric encryption obsolescence
(2) Automatic password strengthening
(3) Physical server destruction
(4) Zero cryptographic effect
(5) Question not attempted

www.nodia.in

NODIA

ANSWERS

1. (2) Vacuum tubes
First-generation computers, developed between 1940 and 1956, relied on vacuum tubes for circuitry and magnetic drums for memory. These components were large, expensive to operate, and generated significant heat. Despite their size and inefficiency, vacuum tubes enabled the first digital computations, laying the fundamental groundwork for all subsequent electronic computing developments in history.

2. (1) Transistors
The transition from vacuum tubes to transistors defined the second generation of computing between 1956 and 1963. Transistors were significantly smaller, faster, cheaper, and more energy-efficient than their predecessors. This shift allowed computers to become more compact and reliable, facilitating the development of high-level programming languages and expanding the practical utility of computers across various industries.

3. (3) Reliance on punch cards for input
Fourth-generation computers are characterized by the use of Very Large Scale Integration technology and microprocessors, which revolutionized personal computing. Unlike earlier generations that relied on cumbersome punch cards for data entry and processing, modern systems utilize sophisticated input devices like keyboards and mice. This era focused on portability, high-speed processing, and the widespread democratization of technology.

4. (1) Both A and R are true and R is the correct explanation of A.
Third-generation computers introduced integrated circuits, which combined numerous electronic components onto small silicon chips. This technological advancement directly resulted in machines that were notably faster, more reliable, and smaller than previous models. By replacing individual transistors with integrated circuits, manufacturers achieved greater computational efficiency, making the assertion and its supporting reasoning both factually accurate and logically linked.

5. (3) Both Statement I and II are true
Mainframe computers are designed to handle massive volumes of data and simultaneous user transactions, making them essential for large enterprise operations. In contrast, supercomputers focus on executing complex mathematical simulations and intensive scientific calculations like climate modeling. Both definitions accurately describe the distinct roles these powerful computing systems play in modern data processing and high-performance scientific research environments.

6. (2) PARAM 8000 was developed by C-DAC in 1991.
India achieved a significant milestone in high-performance computing with the development of PARAM 8000. This indigenous supercomputer was designed by the Centre for Development of Advanced Computing, known as C-DAC, and officially launched in 1991. Its creation marked India's entry into the global supercomputing arena, demonstrating the nation's capability to build advanced technological infrastructure independently of foreign suppliers.

7. (4) Analog computers
Analog computers process information by measuring physical quantities that vary continuously, such as electrical voltage, hydraulic pressure, or mechanical movement. Unlike digital computers that use discrete binary digits, analog systems are particularly effective for solving complex differential equations and simulating real-world physical systems in real-time. These characteristics make them suitable for specialized engineering applications and scientific research.

8. (1) A-ii, B-i, C-iv, D-iii
Computer evolution is categorized by specific technological milestones. The first generation utilized vacuum tubes, while the second generation introduced transistors. The third

Click Here to Buy book on Amazon

generation was defined by integrated circuits, leading to the fourth generation's use of microprocessors. This progression reflects the continuous miniaturization and increased efficiency of electronic components, which has driven the rapid development of modern computing power.

9. (3) Analog computer
Microcomputers, minicomputers, and mainframe computers are classified based on their size, processing power, and intended use within the digital computing framework. These systems all process discrete binary data. Conversely, analog computers represent a fundamentally different category because they operate on continuous physical variables. This distinction in data processing methodology separates analog systems from the various classes of digital machines.

10. (1) Second Generation - Assembly languages
The second generation of computers marked a shift from primitive machine code to assembly languages, which used mnemonic codes for instructions. This allowed programmers to write code more efficiently than using purely binary sequences. While first-generation machines relied on machine language, subsequent generations introduced high-level languages and natural language processing, reflecting the ongoing evolution of human-computer interaction paradigms.

11. (4) Control Unit (CU)
The Control Unit serves as the primary coordinator within the Central Processing Unit, managing the flow of data and instructions. It interprets commands from the computer's memory and directs other components, such as the ALU and input/output devices, on how to respond. This vital function ensures that all hardware operations are executed in the correct sequence and timing.

12. (1) I and II only
Random Access Memory is characterized as volatile memory because it loses all stored data when the power is removed. It facilitates high-speed data exchange by communicating directly with the CPU during active processing. However, RAM does not store BIOS instructions permanently; that function is reserved for non-volatile ROM chips, which retain firmware even when the computer is off.

13. (3) Dynamic ROM requires continuous refreshing to maintain data
Read-Only Memory is inherently non-volatile, meaning it retains information without power. While different types like EEPROM allow for electrical erasure and reprogramming, the concept of a dynamic ROM requiring continuous refreshing is incorrect. Refreshing is a characteristic of Dynamic RAM, not ROM. ROM is primarily used to store permanent firmware that remains stable throughout the life of the hardware.

14. (4) Cache Memory
Cache memory provides the highest access speed for the processor by storing frequently used data and instructions extremely close to the CPU cores. While RAM is faster than secondary storage devices like SSDs or HDDs, cache memory is designed to minimize the time the CPU spends waiting for data. This proximity significantly enhances overall system performance during complex computational tasks.

15. (1) Reduced virtual memory reliance
Adding more physical RAM increases the amount of high-speed memory available for active processes, which reduces the system's need to swap data to slower secondary storage. When page fault rates are high, the computer spends excessive time accessing virtual memory on the hard drive. Increasing RAM allows more data to stay in main memory, improving overall system responsiveness.

16. (2) Registers, Cache, RAM, Magnetic Disk
The memory hierarchy in a computer is organized by speed and proximity to the processor. Registers located within the CPU are the fastest, followed closely by cache memory. RAM serves as the main working memory with moderate speeds, while magnetic disks represent slower secondary storage. This structure balances high-performance needs with the cost and capacity requirements of data storage.

17. (2) Use of NAND flash memory
Solid State Drives differ from Hard Disk Drives primarily by utilizing NAND-based flash

NODIA

memory instead of rotating magnetic platters and mechanical read-write heads. This lack of moving parts makes SSDs significantly faster, more durable, and quieter than HDDs. Because they store data electronically on chips, SSDs offer nearly instantaneous data access speeds, drastically improving system boot times and application loading.

18. (1) Microphone - Output device
Hardware devices are classified as input or output based on the direction of data flow relative to the computer. Scanners and barcode readers are input devices because they send data to the computer, while plotters are output devices that produce physical drawings. A microphone is an input device because it converts sound waves into digital signals for the computer to process.

19. (3) Connects all hardware components
The motherboard acts as the central communication backbone for a computer system, providing the physical platform and electrical paths required for components to interact. It houses the CPU, memory modules, and expansion cards while offering ports for peripheral devices and storage. By facilitating data exchange between all hardware elements, the motherboard ensures the integrated functionality of the entire computer architecture.

20. (4) Virtual Memory
Virtual memory is a management technique that allows a computer to compensate for physical RAM shortages by temporarily transferring data from RAM to disk storage. This process creates an illusion of larger memory capacity for applications, enabling the system to run more complex programs simultaneously. While slower than physical RAM, it prevents system crashes by managing memory resources more dynamically.

21. (3) Manages resources and platforms
System software consists of programs that control and manage the basic operations of computer hardware and provide a platform for application software to run. The most critical example is the operating system, which handles memory management, process scheduling, and file systems. By coordinating hardware resources, system software ensures that the computer functions efficiently and provides a stable user environment.

22. (4) I, II, III, and IV
Compilers and interpreters are distinct translation tools for programming languages. A compiler converts the entire source code into machine code before execution, resulting in faster performance. Conversely, an interpreter translates and executes code line by line, consuming less memory during the process. Understanding these differences is essential for developers when choosing the most appropriate tool for specific software development needs.

23. (4) Database Management System
Utility software performs specific tasks related to the maintenance and optimization of a computer system, such as disk defragmentation, antivirus protection, and file backups. These tools ensure the computer runs smoothly and securely. In contrast, a Database Management System is classified as application software because its primary purpose is to allow users to create, manage, and query structured data.

24. (1) Low-level language
Assembly language is classified as a low-level programming language because it provides a strong correspondence between the language instructions and the architecture's machine code. It uses mnemonic symbols to represent machine operations, making it more readable than binary code while still remaining hardware-specific. This allows for precise control over computer resources, which is vital for system-level programming and driver development.

25. (1) Both Statement I and II are correct
Object-Oriented Programming is a paradigm centered around the concept of objects, which contain both data and code. Languages like C++ and Java are prominent examples that implement core OOP principles including inheritance, polymorphism, and encapsulation. These concepts allow developers to create modular, reusable, and maintainable software architectures, which is essential for managing the complexity of modern application development.

Downloaded from www.pdf.tube

26. (1) Linux
Python, Java, and C++ are high-level programming languages used by developers to write software and create applications. Each language follows specific syntax rules and paradigms to communicate instructions to a computer. Linux, however, is an operating system, which is system software that manages hardware and provides the environment where these programming languages and their resulting applications function.

27. (1) A-iv, B-ii, C-iii, D-i
Software types are categorized by their specific functions within a computing environment. Operating systems like Windows 11 manage resources, while application software like Microsoft Word performs user-specific tasks. Utility software such as Disk Cleanup maintains system health, and firmware like BIOS provides low-level hardware control. This classification helps in understanding how different software layers interact to provide a complete experience.

28. (2) Low-level ROM-based hardware control
Firmware is a specific class of computer software that provides the low-level control for a device's specific hardware. Usually stored on non-volatile memory devices like ROM, EPROM, or flash memory, it remains intact even when power is lost. Firmware acts as a permanent set of instructions that allows hardware to communicate with other software, ensuring the device operates correctly.

29. (3) Device driver
A device driver is a specialized type of system software that acts as a translator between the operating system and a specific hardware peripheral, such as a printer. Without the correct driver, the OS cannot communicate commands to the hardware effectively. Installing the appropriate driver ensures that the printer's unique features and functions are recognized and utilized by the computer system.

30. (4) Low cost and high customizability
Open-source software like Linux provides enterprises with the freedom to view, modify, and redistribute the source code without significant licensing fees. This transparency allows for high customizability, enabling organizations to tailor the software to their specific operational needs. Additionally, the collaborative nature of open-source development often leads to robust security and innovation, making it a cost-effective alternative.

31. (1) Managing computer hardware and software resources
An operating system is the most fundamental system software that acts as an intermediary between the computer user and the hardware. Its primary functions include memory management, process scheduling, file system organization, and device communication. By efficiently allocating resources and providing a consistent interface, the OS ensures that various applications can run smoothly and securely on the underlying hardware components.

32. (1) I, II, III, and V only
Linux is an influential open-source operating system based on Unix architecture, with a kernel originally developed by Linus Torvalds. It is widely utilized across various platforms, including Android mobile devices. Contrary to the idea that it is strictly a command-line interface, most modern Linux distributions offer sophisticated graphical user interfaces, making the system accessible to both developers and everyday users.

33. (2) Windows completely lacks support for multi-threading
Windows is a proprietary operating system developed by Microsoft that supports advanced features like the Cortana assistant and the NTFS file system. A critical technical characteristic of modern Windows versions is their robust support for multi-threading, which allows multiple parts of a program to execute concurrently. This capability is essential for maximizing the performance of modern multi-core processors in multitasking.

34. (1) Multitasking
Multitasking is the ability of an operating system to execute multiple tasks or programs seemingly at the same time. This is achieved through rapid context switching, where the CPU allocates small time slices to different processes in quick succession. This technique allows users to perform various activities, such as browsing the

NODIA

web while listening to music, without perceiving any significant delays.

35. (3) Linux Kernel
The Android operating system is built upon a modified version of the Linux kernel, which provides the core services required for hardware management, memory allocation, and process execution. By utilizing the proven stability and security of the Linux architecture, Android provides a robust foundation for millions of mobile applications. This open-source base has facilitated the widespread adoption of Android across hardware.

36. (2) III, II, I, IV
The booting process follows a strict chronological sequence to ensure hardware readiness. It begins with the execution of BIOS, followed immediately by the Power-On Self Test to check system components. Once hardware is verified, the OS kernel is loaded into RAM from secondary storage. Finally, initialization processes like systemd start, bringing the operating system into a fully functional user state.

37. (3) A is true but R is false.
Open-source operating systems like Linux promote transparency by allowing users to inspect, modify, and distribute the source code. While this collaborative environment often leads to rapid security patches and community-driven improvements, it does not make the system entirely immune to malware. All software remains susceptible to various security threats, regardless of whether the source code is public or proprietary.

38. (2) Batch OS - Groups similar jobs for sequential execution without user interaction
A Batch Operating System is designed to process similar jobs in groups without direct user intervention, maximizing throughput for repetitive tasks. In contrast, Real-Time OS must meet strict timing constraints, and Time-Sharing OS allows multiple users to share CPU resources simultaneously. These different OS types are tailored to specific processing requirements, ranging from scientific calculations to interactive personal computing.

39. (4) Source code compilation
Operating systems are responsible for fundamental tasks like managing memory, coordinating process scheduling, and organizing file systems. These functions ensure the efficient use of hardware resources. However, source code compilation is the responsibility of specialized development tools called compilers. While the OS provides the environment for compilers to run, the actual translation of high-level code into machine language is not.

40. (1) Graphical User Interface (GUI)
A Graphical User Interface uses visual elements like windows, icons, and menus to allow users to interact with the operating system intuitively. This contrasts with a Command Line Interface, which requires text-based commands. GUIs have made computing accessible to a broad audience by providing a user-friendly way to navigate files, launch applications, and manage settings through direct manipulation of metaphors.

41. (3) A discrete value of either 0 or 1
In the binary number system, a bit represents the most basic unit of information in computing. It can exist in only one of two states, typically denoted as 0 or 1. These states correspond to the physical “off” or “on” positions of electronic switches within a processor. All complex data, from text to video, is built from combinations.

42. (2) 4 bits
A nibble is a data unit that consists of exactly 4 bits, representing half of a standard 8-bit byte. Because a nibble contains four binary digits, it can represent sixteen distinct values, ranging from 0 to 15. This unit is particularly useful in hexadecimal representation, as each hexadecimal digit corresponds directly to the value of a single nibble in binary.

43. (1) Both Statement I and II are correct
ASCII was the early standard for character encoding, but its limited capacity could only represent English characters and basic symbols. As computing became global, Unicode was developed to provide a unique number for every character across all world languages. Both standards are essential for text representation, with Unicode effectively expanding upon the

Click Here to Buy book on Amazon

foundation laid by ASCII to ensure universal compatibility.

44. (1) Both A and R are true and R is the correct explanation of A.
Digital computers utilize the binary number system because it perfectly aligns with the physical reality of electronic circuits. These circuits are built using transistors that function as switches, which are either conducting electricity or not. By using base 2, computers can reliably represent data and perform logical operations using these two fundamental states, making the binary system the most efficient architecture.

45. (3) Human-friendly shorthand for binary
Hexadecimal is used in computer science as a convenient way to represent long strings of binary digits. Since one hexadecimal digit represents exactly four bits, it significantly reduces the length of data strings, making them easier for humans to read and debug. This shorthand is commonly seen in memory addresses, color codes, and various low-level programming tasks where binary clarity.

46. (4) One Megabyte (MB) equals 1024 Gigabytes (GB).
Computer data storage units follow a hierarchical structure based on powers of two. While 8 bits form a byte and 1024 bytes form a kilobyte, the progression continues to megabytes, gigabytes, and terabytes. The assertion that one megabyte equals 1024 gigabytes is mathematically incorrect; in reality, it takes 1024 megabytes to constitute a single gigabyte, reflecting the increasing scale of storage.

47. (1) 1101
Converting the decimal number 13 to binary involves dividing by two and tracking the remainders. Dividing 13 by 2 gives a remainder of 1, 6 by 2 gives 0, 3 by 2 gives 1, and 1 by 2 gives 1. Reading these remainders in reverse order yields 1101. This binary sequence represents the sum of powers of two: eight, four, and one.

48. (1) A-ii, B-i, C-iv, D-iii
Data storage units are based on binary multipliers where each level increases by a factor of 2 to the power of 10. A kilobyte is 2 to the 10th power, a megabyte is 2 to the 20th power, a gigabyte is 2 to the 30th power, and a terabyte is 2 to the 40th power. This exponential scale allows for precise measurement.

49. (2) Algorithmic
Binary, octal, and hexadecimal are all positional numeral systems used in computing to represent data and memory addresses. Each has a specific base—2, 8, and 16, respectively—that facilitates efficient machine processing and human interpretation. "Algorithmic" refers to a set of step-by-step instructions for solving problems rather than a numerical system, making it the distinct outlier in this categorization.

50. (1) ASCII and EBCDIC
Character encoding schemes are essential for translating human-readable text into digital format. ASCII is the most widely recognized standard for English characters, while EBCDIC is an older encoding scheme primarily used on IBM mainframe systems. These standards ensure that text is stored and transmitted consistently across different hardware platforms, unlike networking protocols or file systems which serve entirely different technical purposes.

51. (3) Wide Area Network (WAN)
Wide Area Networks are designed to connect computers and smaller networks over expansive geographic distances, such as across cities, countries, or even continents. Unlike Local Area Networks which are confined to a single building, WANs utilize diverse communication links like satellites, leased lines, and fiber optics. The Internet itself is the most prominent example of a global WAN.

52. (1) I and II only
Network topologies describe the physical or logical arrangement of connected devices. Star topology utilizes a central hub to manage communication, while bus topology features a single backbone cable shared by all nodes. Ring topology, however, connects devices in a closed loop where each device is linked to exactly two others. Understanding these configurations is vital for designing efficient and reliable network architectures.

NODIA

53. (3) VPNs eliminate the need for an Internet Service Provider (ISP).
Virtual Private Networks enhance online security by creating an encrypted tunnel for data transmission and masking user IP addresses. This protection is especially useful for remote work and public Wi-Fi usage. However, a VPN still requires an underlying internet connection to function; it does not replace the service provided by an ISP, which remains the physical gateway to the internet infrastructure.

54. (2) Extranet
An extranet is a controlled private network that allows external partners, such as suppliers or vendors, to access specific parts of an organization's internal intranet. This technology facilitates secure collaboration and information sharing between different entities while maintaining restricted access for the general public. It bridges the gap between a strictly internal intranet and the completely open public internet environment.

55. (4) Physical hardware address vs logical network address
Device identification in networking involves two distinct types of addresses. A MAC address is a unique, permanent physical identifier assigned to a network interface card during manufacturing. In contrast, an IP address is a logical identifier assigned by a network to facilitate communication across different segments. Together, these addresses ensure that data packets are correctly routed through the internet to the intended hardware.

56. (1) Compiler
Networking devices like switches, routers, and bridges are hardware components essential for directing data traffic and connecting different network segments. They operate at various layers of the OSI model to ensure efficient communication. A compiler, however, is a software tool used to translate high-level programming code into machine language. It plays no role in the physical or logical routing of data.

57. (3) Pulses of light through glass or plastic
Fiber optic cables revolutionize data transmission by using pulses of light to carry information through thin strands of glass or plastic. This technology offers significantly higher bandwidth and faster speeds than traditional copper wires. Furthermore, because they use light rather than electricity, fiber optics are entirely immune to electromagnetic interference, making them ideal for long-distance and high-performance networking infrastructure in modern systems.

58. (1) Switch - Forwards packets to a specific device using MAC addresses
A network switch improves efficiency by using MAC addresses to direct data packets specifically to the intended recipient device within a local network. This reduces unnecessary traffic compared to hubs, which broadcast data to all ports. Routers serve a different function by connecting separate networks, while modems translate signals from an ISP. Each device performs a specific role in maintaining network connectivity.

NODIA

59. (1) Both Statement I and II are correct
Network architectures define how resources are shared among connected devices. The client-server model features centralized servers providing services to multiple client machines, ensuring controlled resource management. Alternatively, peer-to-peer architecture allows every node to act as both a client and a server, sharing resources directly without a central authority. Both models are fundamental to modern networking, supporting diverse applications from web hosting to file.

60. (2) Packet loss and increased latency (delay)
Network congestion occurs when the volume of data traffic exceeds the capacity of the network's links or nodes. This bottleneck leads to increased latency as packets wait in queues, and potentially high rates of packet loss if buffers overflow. For users, this manifests as slow loading times, buffering in video streams, and intermittent connectivity issues, reflecting the strained capacity of the network infrastructure.

61. (3) TCP/IP
The TCP/IP suite is the foundational set of protocols that enables global communication over the Internet. It consists of the Transmission Control Protocol, which ensures reliable data delivery, and the Internet Protocol, which

handles the addressing and routing of data packets. Together, these protocols allow diverse computer systems across the world to exchange information seamlessly, regardless of their underlying hardware or software.

62. (4) I, II, III, and IV
Web communication relies on protocols like HTTP and its secure version, HTTPS. While HTTP facilitates standard data transfer on port 80, HTTPS adds a layer of security by encrypting data using SSL or TLS certificates. This encryption is vital for protecting sensitive information, such as login credentials and financial details, ensuring that communication between the browser and the web server remains confidential.

63. (1) It encrypts email attachments for secure transmission.
The Domain Name System functions as the phonebook of the Internet, translating human-friendly domain names like google.com into numerical IP addresses that computers use to identify each other. This service is essential for user-friendly web navigation, as it eliminates the need to memorize complex numbers. However, DNS is strictly an addressing service and does not provide encryption for emails or other data attachments.

64. (1) Both A and R are true and R is the correct explanation of A.
The transition from IPv4 to IPv6 became necessary because the 32-bit addressing scheme of IPv4 could only support about 4.3 billion unique addresses. With the explosion of internet-connected devices, this supply was exhausted. IPv6 utilizes a 128-bit addressing format, providing a virtually unlimited number of unique IP addresses, ensuring that the global internet can continue to expand and accommodate future growth.

65. (2) To provide users and organizations with access to the internet
An Internet Service Provider is a company that provides the essential infrastructure and services required for individuals and businesses to connect to the global internet. ISPs manage the physical network links, such as fiber optics or satellite connections, and assign IP addresses to their customers. Without the services of an ISP, users would be unable to access websites, emails, or cloud-based applications.

66. (1) POP3 - Receiving Emails
Specific protocols are designed for different internet tasks. POP3 and IMAP are used for receiving emails from a server, while SMTP is dedicated to sending emails. For file management, FTP is used to transfer files between computers. Understanding these protocols is crucial for configuring email clients and web services, as each serves a distinct role in the exchange of digital information across networks.

67. (3) Packet switching
Packet switching is the fundamental transmission method used on the internet, where data is broken into small chunks called packets. Each packet is routed independently across the network based on the most efficient available path and reassembled at the destination. This method is highly efficient and resilient, as it allows multiple users to share network resources simultaneously without requiring a dedicated physical circuit.

68. (1) A-iii, B-i, C-iv, D-ii
Internet operations are governed by several key protocols with specific functions. TCP manages data integrity and delivery, while IP handles the logical addressing of devices. For web content, HTTP defines how resources are requested and transmitted, and FTP is specialized for file transfers. These protocols work together within the network stack to provide the diverse range of services users expect online.

69. (3) BIOS
Standard internet operations rely on a suite of protocols including TCP for reliable delivery, UDP for fast transmission, and ICMP for network diagnostics. These protocols operate at different layers to facilitate data exchange. BIOS, however, is a firmware interface used to initialize computer hardware during the booting process. It functions entirely within the local machine and is not a protocol for network communication.

70. (1) Both Statement I and II are correct
A Uniform Resource Locator is a standardized address used to identify and locate specific resources on the World Wide Web. A complete URL includes the protocol being used, the

Downloaded from www.pdf.tube

domain name of the hosting server, and the specific path to the desired file or resource. This system ensures that web browsers can accurately find and retrieve the exact content requested by a user.

71. (4) Platform built upon the global network
While often used interchangeably, the Internet and the World Wide Web are distinct concepts. The Internet is the vast physical infrastructure of interconnected networks and hardware. The World Wide Web is an application or platform built on top of this infrastructure, consisting of billions of linked documents and resources accessible via web browsers. Essentially, the Internet provides the tracks, while the Web.

72. (1) I, II, and III only
Search engines rely on three core processes to provide results: crawling, indexing, and ranking. Web crawlers or spiders continuously discover new and updated pages, which the indexer then catalogs in a massive database. Finally, search algorithms evaluate these indexed pages to determine their relevance and order for specific user queries. While user interfaces and servers are necessary, they are not.

73. (3) Web browsers host the websites they display on local hard drives.
Web browsers are application software, such as Chrome or Firefox, that allow users to access and display information from the World Wide Web. They function by rendering HTML and other code into visual pages. It is important to note that browsers do not host websites themselves; instead, websites are hosted on remote web servers and accessed by browsers over the internet.

74. (1) Cookies
Cookies are small text files stored on a user's computer by a web browser at the request of a website. They are used to track user activity, remember login credentials, and store site preferences, providing a personalized browsing experience. By maintaining state across different sessions, cookies allow websites to recognize returning visitors and deliver customized content or maintain active shopping cart items.

75. (4) Tim Berners-Lee
Tim Berners-Lee is the visionary computer scientist who invented the World Wide Web in 1989 while working at CERN. He developed the fundamental technologies that still power the web today, including HTML for document formatting, HTTP for data transfer, and the first web browser. His decision to keep these technologies open and royalty-free allowed the web to grow into a global platform.

76. (2) Mozilla Firefox
Google, Bing, and DuckDuckGo are search engines, which are online tools designed to help users find information on the World Wide Web by indexing and ranking pages. Mozilla Firefox, however, is a web browser, which is the application software used to access and view those web pages. This distinction between the tool that searches and the tool that displays is fundamental.

77. (3) Special software access vs non-indexed data
The Deep Web consists of all parts of the internet not indexed by standard search engines, including private databases, emails, and subscription-based content. The Dark Web is a small, intentional subset of the Deep Web that requires specialized software like Tor to access. While both are hidden from public search results, the Dark Web specifically focuses on anonymity and requires unique technical tools.

78. (1) Both Statement I and II are correct
The evolution of the web is marked by a shift from static to dynamic content. Web 1.0 was primarily a "read-only" environment where users consumed information from static pages. Web 2.0 transformed this into a "read-write" platform characterized by high interactivity, social media, and user-generated content. This transition empowered individuals to become creators and participants in the global digital conversation, rather than just.

79. (1) MAC Addressing
The World Wide Web is built on a specific set of core technologies, including HTML for structuring content, HTTP for transmitting data, and URLs for locating resources. These technologies operate at the application layer to provide a unified web experience. MAC

NODIA

addressing, conversely, is a low-level hardware identification method used at the data link layer of a network, functioning independently of web.

80. (2) Increase visibility and ranking in results
Search Engine Optimization involves implementing various strategies and techniques to improve a website's ranking in search engine results pages. By optimizing content, keywords, and technical aspects, site owners aim to increase organic traffic and visibility to potential users. High SEO rankings ensure that a website appears more prominently when users search for related topics, directly impacting its online reach and success.

81. (2) Trojan Horse
A Trojan Horse is a type of malicious software that disguises itself as a legitimate or harmless program to deceive users. Once installed, it can perform various harmful actions, such as stealing sensitive data, providing unauthorized access, or installing additional malware. Unlike worms, Trojans do not self-replicate; they rely on social engineering to trick individuals into compromising their own system security.

82. (1) Spoofing - Masquerading as a trusted entity to intercept data
Cybersecurity involves protecting systems from various threats. Spoofing occurs when an attacker masquerades as a trusted source to gain access to data. Phishing is a similar technique using fraudulent communication. Conversely, keyloggers record keystrokes, and ransomware encrypts data for money. Understanding these distinct threats is essential for implementing effective defense strategies and maintaining the integrity of digital information and systems.

83. (3) A firewall completely guarantees that a network can never be hacked.
Firewalls are essential security tools that monitor and control network traffic based on predefined rules, creating a barrier between trusted and untrusted networks. They can be implemented as hardware or software. While they significantly enhance security, it is incorrect to claim they provide a complete guarantee against hacking. Robust security requires a multi-layered approach, as no single tool is entirely infallible.

84. (1) Both A and R are true and R is the correct explanation of A.
Asymmetric encryption, also known as public-key cryptography, uses a pair of mathematically related keys for secure communication. The public key is used to encrypt data, and only the corresponding private key can decrypt it. this method ensures that even if the public key is intercepted, the data remains secure, providing a powerful mechanism for confidentiality and authentication in digital exchanges.

85. (3) Ransomware
Ransomware is a particularly damaging form of malware that encrypts a victim's files, making them inaccessible until a ransom is paid. Attackers typically demand payment in cryptocurrency to provide the decryption key. This type of cyberattack targets individuals and large organizations alike, highlighting the critical importance of regular data backups and robust security measures to prevent significant operational and financial.

86. (2) Distributed Denial of Service (DDoS)
A Distributed Denial of Service attack occurs when multiple compromised computer systems flood a target server or network with an overwhelming volume of traffic. This surge in requests exhausts the target's resources, causing it to slow down or crash entirely. Such attacks are often launched using botnets and are designed to disrupt online services, making them unavailable to legitimate users.

87. (4) Complex password generation
Biometric security measures utilize unique physical or behavioral characteristics of an individual for authentication, such as fingerprints, retina patterns, or facial features. These methods are highly secure as they are difficult to replicate. In contrast, complex password generation is a traditional knowledge-based security method. While important for protecting accounts, passwords rely on something a user knows rather than their inherent biological.

88. (1) A-ii, B-iv, C-i, D-iii
Cyber threats take many forms, each with specific characteristics. Worms are self-replicating malware, while spyware secretly monitors user activity. Phishing uses deceptive

Click Here to Buy book on Amazon

emails to steal data, and SQL injection involves inserting malicious code into database queries. Recognizing these different attack vectors is essential for developing comprehensive cybersecurity protocols and protecting sensitive data from unauthorized access or malicious interference.

89. (1) Both Statement I and II are correct
Digital signatures provide a powerful way to ensure the authenticity and integrity of electronic documents. By using public-key cryptography and hash functions, they verify the identity of the sender and confirm that the document has not been altered since it was signed. This technology supports non-repudiation, meaning the signer cannot later deny having signed the document, which is vital.

90. (1) Using Two-Factor Authentication (2FA)
Two-Factor Authentication significantly enhances account security by requiring two different forms of identification before granting access. Typically, this involves something the user knows, like a password, and something they have, such as a code sent to their smartphone. This multi-layered approach ensures that even if a password is stolen, the account remains protected from unauthorized access by an external attacker.

91. (4) Internet-based computing services
Cloud computing is the on-demand delivery of various computing services over the internet, including servers, storage, databases, and software. Instead of owning and maintaining physical data centers and hard drives, users can access technology resources from providers like AWS or Google Cloud. This model offers increased flexibility, scalability, and cost-efficiency by allowing users to pay only for the resources they actually use.

92. (4) I, II, and III
Cloud computing is organized into three primary service models. Software as a Service delivers ready-to-use applications over the web. Platform as a Service provides the tools and framework for developers to create software. Infrastructure as a Service offers fundamental computing resources like virtual servers and storage. Each model offers different levels of control and management, allowing organizations to choose the best fit.

93. (3) Public clouds generally require organizations to purchase and maintain their own server hardware.
Public clouds are owned and operated by third-party providers who deliver computing resources over the internet, sharing them among multiple customers. This model eliminates the need for organizations to buy or maintain their own hardware. In contrast, private clouds are dedicated to a single organization, often offering more control. Hybrid clouds combine these models, allowing data and applications to be shared.

94. (4) Hybrid Cloud
A hybrid cloud architecture combines the benefits of both public and private clouds, allowing organizations to maintain sensitive data on a secure private infrastructure while leveraging public cloud services for less critical tasks. Rajasthan's RajMegh system exemplifies this by hosting core e-governance applications privately while using commercial cloud services for public data. This approach optimizes security, compliance, and cost-effectiveness.

NODIA

95. (1) Edge Computing
Edge computing is a distributed computing paradigm that brings data storage and processing closer to the devices where the data is generated, rather than relying on a centralized cloud. This proximity reduces latency and bandwidth usage, which is essential for real-time applications like autonomous vehicles or industrial automation. By processing data at the "edge" of the network, response times.

96. (2) SaaS, PaaS, IaaS
Cloud service models vary by the level of management provided by the service provider. In Software as a Service, the provider manages everything from the hardware to the application. Platform as a Service gives the provider control over the underlying infrastructure while the user manages applications. Infrastructure as a Service requires the user to manage operating systems and data, offering the.

97. (2) Microsoft Excel
Amazon Web Services, Microsoft Azure, and Google Cloud Platform are major cloud computing providers that offer a vast array of on-demand services for infrastructure, platforms, and software. They represent the backbone of the global cloud market. Microsoft Excel, however, is a spreadsheet application used for data organization and analysis. While a version of it exists in the cloud, the.

98. (1) Virtualization
Virtualization is the core technology that enables cloud computing by allowing multiple virtual machines to run on a single physical server. It creates an abstraction layer between the hardware and the software, enabling the efficient pooling and sharing of resources. This technology provides the scalability and flexibility that define cloud services, allowing providers to dynamically allocate computing power according to demand.

99. (3) Mandatory localized hardware maintenance
Standard definitions of cloud computing emphasize key characteristics such as on-demand self-service, broad network access, and rapid elasticity. These features allow users to access and scale resources as needed without direct human interaction with the provider. Significantly, cloud computing removes the burden of mandatory localized hardware maintenance from the user, as the service provider handles all physical infrastructure management and updates.

100. (4) Dynamic resource scaling capability
Scalability is a primary benefit of cloud computing, allowing businesses to adjust their computing resources quickly and easily to meet changing demands. For a growing startup, this means they can start with minimal infrastructure and expand dynamically as their user base grows. This "pay-as-you-go" model eliminates the need for large upfront capital investments in hardware, providing significant financial and operational.

101. (3) AI is the overarching concept, ML is a subset of AI, and DL is a specialized subset of ML
Artificial Intelligence represents the broad field of creating machines capable of mimicking human intelligence. Machine Learning is a specific approach within AI that uses algorithms to learn patterns from data without explicit programming. Deep Learning further refines this by utilizing complex artificial neural networks with multiple layers. This hierarchical relationship defines the modern landscape of advanced computational intelligence technologies in various fields.

102. (1) I, II, and III only
Machine learning encompasses several distinct approaches. Supervised learning uses labeled data for training, while unsupervised learning identifies patterns in unlabeled data. Reinforcement learning utilizes a system of rewards and punishments to guide behavior. Importantly, deep learning relies heavily on artificial neural networks to process information, making the claim that it avoids their use factually incorrect within the context of computer science.

103. (4) They cannot be used for pattern recognition or image processing.
Artificial Neural Networks are computational models inspired by the structure of the human brain, consisting of interconnected layers of nodes. They are exceptionally effective at identifying complex patterns, making them a cornerstone of modern image and speech recognition technologies. Deep Learning specifically uses networks with many hidden layers to improve accuracy, contradicting the idea that these models are incapable of.

104. (1) Natural Language Processing (NLP)
Natural Language Processing is the branch of artificial intelligence that focuses on the interaction between computers and human language. It enables machines to understand, interpret, and generate human-like text and speech. This technology is the core component of virtual assistants and chatbots, allowing them to process voice commands and provide meaningful responses, which is essential for modern human-computer interaction.

105. (3) Measure human-like machine intelligence
The Turing Test was designed to determine if a machine could exhibit intelligent behavior indistinguishable from that of a human. In this test, a human judge engages in natural language conversations with both a human and a machine. If the judge cannot reliably tell them apart, the machine is said to have passed. It remains a foundational concept in the.

Downloaded from www.pdf.tube

106. (1) Computer Vision - Facial recognition systems
Artificial intelligence is divided into various domains with specific practical applications. Computer vision enables machines to interpret and understand visual information from the world, directly powering technologies like facial recognition. In contrast, natural language processing handles text and speech, while reinforcement learning is often used for complex decision-making in gaming or robotics. Matching these domains with their correct applications.

107. (1) Both Statement I and II are correct
Generative AI refers to advanced algorithms that can create entirely new content, including text, images, and audio, by learning from massive datasets. Prominent examples like ChatGPT and DALL-E demonstrate the power of these models to produce human-like responses and creative visuals. This technology represents a significant shift in AI, moving from simple data analysis to the active creation of.

108. (1) A-iii, B-i, C-iv, D-ii
Understanding AI requires defining its core components. Algorithms provide the rules for processing, while datasets supply the information used for learning. Training is the active phase where the AI identifies patterns, and inference is the application of that learned knowledge to new situations. Together, these elements form the lifecycle of an AI system, from its initial development to its.

109. (3) Relational Database Normalization
Artificial Intelligence encompasses fields like machine learning, robotics, and natural language processing, all focused on creating intelligent systems. These areas work together to enable machines to learn, move, and communicate. Relational database normalization, however, is a data management technique used to organize tables to reduce redundancy and improve integrity. While useful for storing data, it is not a core component.

110. (4) Expert Systems
Expert systems are specialized AI programs designed to solve complex problems by mimicking the decision-making ability of a human expert in a specific field. They utilize a knowledge base and an inference engine to provide advice or diagnoses, such as in medical or legal settings. Unlike general-purpose chatbots, expert systems are deeply focused on a single domain to.

111. (1) Data size and storage magnitude
In the context of Big Data, Volume refers to the sheer scale and amount of information being generated every second. This includes the massive quantities of data from social media, sensors, and business transactions that must be stored and processed. Managing this magnitude of data requires advanced infrastructure and distributed systems capable of handling petabytes or exabytes of information efficiently.

112. (4) I, II, III, IV, and V
Big Data is defined by the 5Vs: Volume, Velocity, Variety, Veracity, and Value. These characteristics describe the scale, speed, diversity, reliability, and ultimately the usefulness of the information. Together, they provide a comprehensive framework for understanding the challenges and opportunities of analyzing massive datasets. Mastering these five dimensions is essential for organizations to derive meaningful and actionable insights from.

113. (2) Big Data analytics is solely concerned with analyzing highly structured tabular data.
Big Data encompasses a wide range of formats, including structured data in relational databases, semi-structured data like JSON, and unstructured data such as videos and social media posts. The strength of Big Data analytics lies in its ability to process all these diverse types, not just traditional tabular data. By integrating unstructured information, organizations can gain a more complete.

114. (1) Big Data Predictive Analytics
Predictive analytics involves using historical data, statistical algorithms, and machine learning techniques to identify the likelihood of future outcomes. In healthcare, analyzing patient records to forecast disease outbreaks is a powerful application of this technology. By identifying patterns and trends early, medical professionals can take proactive measures to improve public health outcomes and allocate resources more effectively before a crisis.

NODIA

115. (3) Apache Hadoop
Apache Hadoop is a foundational open-source framework designed for the distributed storage and processing of exceptionally large datasets across clusters of computers. It utilizes the Hadoop Distributed File System for storage and MapReduce for processing, allowing for high scalability and fault tolerance. As a core tool in the Big Data ecosystem, Hadoop enables organizations to handle massive information volumes.

116. (4) Descriptive, Diagnostic, Predictive, Prescriptive
The Data Analytics Maturity Model tracks the progression from understanding the past to optimizing the future. It begins with descriptive analytics to explain what happened, followed by diagnostic analytics to understand why. Predictive analytics then forecasts future trends, and finally, prescriptive analytics provides recommendations on how to achieve specific goals. This sequence represents increasing organizational value and technical complexity in data.

117. (3) Virtualization
The characteristics of Big Data are traditionally defined by several "Vs," including Velocity, Variety, and Veracity. These terms describe the speed, diversity, and reliability of information. While virtualization is a critical technology that supports cloud computing and data center management, it is not one of the fundamental V's used to define Big Data itself. It remains a separate technological.

118. (2) Discovery of patterns in large sets
Data mining is the process of discovering hidden patterns, correlations, and trends within large datasets using a variety of statistical and computational techniques. Its goal is to extract valuable information that can be used to make informed business decisions or scientific discoveries. By transforming raw data into meaningful knowledge, data mining allows organizations to predict behaviors and improve their overall operational.

119. (4) Microsoft Paint
Handling Big Data requires specialized tools like Apache Spark for fast processing, NoSQL databases for flexible storage, and HDFS for distributed file management. These technologies are designed to manage the unique challenges of scale and variety. Microsoft Paint, conversely, is a simple graphics editing application for individual images. It serves no function in the complex ecosystem of data.

120. (1) Forecasting trends and behaviors
Utilizing predictive analytics allows businesses to move beyond historical reporting to actively forecasting future trends and consumer behaviors. By identifying likely outcomes, organizations can optimize their marketing strategies, improve supply chain management, and mitigate potential risks. This forward-looking approach enhances decision-making and provides a competitive advantage by allowing companies to anticipate market changes before they occur in reality.

121. (3) Distributed, decentralized, public ledger
Blockchain technology is fundamentally a distributed and decentralized digital ledger that records transactions across many computers. This structure ensures that the data is transparent, secure, and nearly impossible to alter retroactively without the consensus of the network. By eliminating the need for a central authority, blockchain provides a powerful mechanism for establishing trust and integrity in digital exchanges.

122. (1) Cryptographic Hash Function - Ensuring data immutability and linking blocks
Each block in a blockchain is connected to the previous one using a cryptographic hash function, which creates a unique digital fingerprint for the data. This link ensures immutability, as changing any information would alter the hash and break the chain. While consensus algorithms and digital wallets are also important, the hash function is the primary mechanism for maintaining the.

123. (4) Immutability means any user can easily edit past transactions if they make a mistake.
Immutability is a cornerstone of blockchain, meaning that once a transaction is recorded, it is extremely difficult to change. Altering a block would require re-calculating the hashes for every subsequent block, which is computationally prohibitive in a decentralized network. This feature provides security and prevents fraud.

Click Here to Buy book on Amazon

Contrary to common misunderstandings, it does not allow for easy editing.

124. (1) Both A and R are true and R is the correct explanation of A.
Blockchain technology empowers direct transactions between parties by using cryptographic proof and decentralized consensus instead of relying on intermediaries like banks. This peer-to-peer approach can significantly reduce costs and increase the speed of financial exchanges. By establishing trust through the architecture of the network itself, blockchain offers a fundamental shift in how global value and information.

125. (3) Genesis Block
The very first block in any blockchain network is known as the Genesis Block. It is unique because it does not refer to a previous block and is typically hardcoded into the software that defines the network. This block serves as the foundation for the entire subsequent chain, establishing the initial state and parameters for all following transactions and.

126. (4) Smart contracts
Smart contracts are self-executing agreements with the terms directly written into code on a blockchain. They automatically trigger actions, such as the transfer of funds, when predefined conditions are met. This technology eliminates the need for third-party enforcement, reducing the risk of disputes and increasing efficiency. Smart contracts are essential for decentralized applications and complex digital economies.

127. (1) Both Statement I and II are correct
Public blockchains are open networks where anyone can join, participate in consensus, and view the entire transaction history, as seen in Bitcoin. Private blockchains, however, are restricted networks where access and participation are controlled by a single entity or consortium. Both models offer different advantages in terms of transparency, security, and performance, depending on the specific needs of.

128. (1) A-iv, B-ii, C-i, D-iii
Blockchain relies on several key components: nodes provide the network infrastructure, while miners or validators secure the network and add new blocks. Tokens represent digital assets or value within the system, and the ledger serves as the comprehensive record of all transactions. Together, these elements create a robust and transparent environment for secure digital interactions and decentralized governance.

129. (2) Compiling C++ code into machine language
Blockchain technology has wide-ranging applications, including securing supply chains, powering cryptocurrencies, and enabling transparent voting systems. These uses leverage its decentralized and immutable nature. However, compiling programming code like C++ into machine language is a traditional software development task performed by a compiler. This process is entirely unrelated to the distributed ledger functions or cryptographic mechanisms that define.

130. (1) Proof of Work (PoW)
Proof of Work is the original consensus mechanism used by the Bitcoin network, requiring participants called miners to solve complex mathematical puzzles to validate transactions and create new blocks. This process ensures network security by making it computationally expensive to launch an attack. While other mechanisms like Proof of Stake have since emerged, PoW remains the foundational protocol for.

131. (3) Network of objects with sensors
The Internet of Things refers to a vast network of physical objects embedded with sensors, software, and other technologies that allow them to connect and exchange data with other devices over the internet. These “smart” objects can range from simple household appliances to complex industrial tools. By enabling these devices to communicate, IoT creates a more integrated and.

132. (4) I, II, and III
A functional IoT system requires three core components: sensors to collect environmental data, connectivity protocols to transmit that data, and processing centers to analyze the information and trigger actions. This integrated architecture allows for real-time monitoring and automation across various applications. Without any of these

Downloaded from www.pdf.tube

elements, the system would be unable to gather, share, or make.

133. (3) IoT devices cannot be compromised to form botnets for DDoS attacks.
IoT devices face significant security challenges, including weak default passwords and a lack of encryption, which increases the overall attack surface for hackers. Contrary to the idea that they cannot be compromised, large groups of insecure IoT devices are frequently targeted to form massive botnets used in Distributed Denial of Service attacks. Protecting data privacy remains a critical concern.

134. (2) Smart Home IoT automation
Smart home automation is a practical application of IoT where household devices communicate with each other to improve convenience and efficiency. A thermostat adjusting itself based on a user's smartphone location is a perfect example of this interconnectedness. By using data from various sensors and devices, smart homes can create personalized environments that automatically respond to the.

135. (4) RFID (Radio Frequency Identification)
Radio Frequency Identification is a foundational technology for IoT, using electromagnetic fields to automatically identify and track tags attached to objects. These tags contain electronically stored information that can be read wirelessly. This early innovation paved the way for modern IoT by enabling the seamless tracking of goods in supply chains and the identification of physical items without.

136. (1) Enhancement of industrial processes
The Industrial Internet of Things focuses specifically on the application of IoT technologies in manufacturing and industrial settings. By integrating sensors and advanced analytics into factory equipment and supply chains, IIoT enhances operational efficiency, improves safety, and reduces downtime through predictive maintenance. This technological shift is a key driver of the Fourth Industrial Revolution, transforming traditional manufacturing into smart.

137. (3) HDMI
IoT devices use specialized communication protocols like MQTT, CoAP, and Zigbee, which are designed for low power consumption and efficient data transmission across wireless networks. These protocols are essential for connecting diverse sensors and devices. HDMI, however, is a physical interface and cable standard used for transmitting high-definition video and audio signals between devices, serving an entirely different.

138. (1) Both Statement I and II are correct
IoT systems rely on two primary types of hardware to interact with the world. Sensors are used to gather information from the environment, such as light, temperature, or motion. Actuators, conversely, are used to perform physical actions based on that data, such as opening a valve or turning on a light. Together, these components allow IoT systems to.

139. (4) Mechanical punch cards
Operating an IoT device requires core components like sensors for data collection, network connectivity for communication, and a processing unit to manage operations. These elements work together to enable the device's "smart" functionality. Mechanical punch cards are an obsolete technology used in early computer generations for data entry and have no role in the digital, wireless architecture.

140. (2) Adoption of the IPv6 protocol
The rapid proliferation of billions of IoT devices created a massive demand for unique IP addresses, far exceeding the capacity of the aging IPv4 system. This directly drove the global adoption of IPv6, which offers a virtually unlimited number of addresses. By providing a unique identifier for every connected object, IPv6 ensures that the IoT ecosystem can.

141. (3) Analog signals to digital signals
The transition from the first generation (1G) to the second generation (2G) of mobile technology was defined by the shift from analog to digital signal transmission. While 1G was limited to analog voice calls, 2G introduced digital clarity, improved security through encryption, and enabled new services like SMS text messaging. This digital foundation was essential for all.

NODIA

142. (1) I, II, and III only
5G technology introduces significantly higher data speeds, much lower latency, and the ability to connect a massive number of devices simultaneously compared to previous generations. These improvements enable advanced applications like real-time remote surgery and autonomous driving. While highly efficient, 5G does not eliminate electromagnetic radiation, which is a fundamental property of the radio frequency waves used for.

143. (1) VoLTE heavily decreases voice call quality compared to 2G networks.
Voice over LTE (VoLTE) is a technology that allows voice calls to be transmitted as data packets over the 4G network, offering significantly better call quality and faster connection times than older 2G or 3G systems. Prior to VoLTE, 4G phones had to drop back to older networks for calls. Contrary to the incorrect statement, VoLTE markedly.

144. (2) Network Slicing
Network slicing is a key feature of 5G that allows a single physical network infrastructure to be divided into multiple virtual networks, each optimized for specific performance requirements. For example, one slice can be dedicated to low-latency autonomous driving, while another handles high-bandwidth video streaming. This flexibility ensures that diverse applications can coexist on the same network.

145. (2) 2G and 3G
GSM and CDMA were the two dominant and competing standards during the second and third generations of mobile networks. While GSM became the global standard for digital voice and SMS, CDMA was widely used in specific regions for its efficient data handling. These technologies laid the groundwork for the mobile web before being largely superseded by the unified.

146. (1) 3G - Introduction of mobile web browsing and data services
Each mobile generation is defined by a major technological leap. 3G was the first generation to make mobile broadband and web browsing a reality for the general public, moving beyond the simple voice and text of 2G. While 1G provided basic analog voice and 4G introduced high-speed LTE, 3G was the essential bridge to the modern smartphone.

147. (1) Both Statement I and II are correct
Massive MIMO is a fundamental technology in 5G that utilizes a large number of antennas at the base station to send and receive more data simultaneously. This approach significantly increases network capacity and improves signal quality for users. By focusing signals directly toward specific devices, Massive MIMO enhances overall efficiency, allowing 5G networks to handle the massive data.

148. (1) A-iii, B-i, C-iv, D-ii
The evolution of mobile networks is marked by distinct features: 1G used analog voice, 2G introduced digital voice and SMS, 3G brought mobile broadband, and 4G provided high-speed IP-based LTE networks. Each generation has expanded the capabilities of mobile devices, from simple communication tools to powerful multimedia platforms, reflecting the rapid pace of global telecommunications innovation.

149. (3) Sending basic text-only emails
5G is designed for high-performance applications that require massive bandwidth or ultra-low latency, such as remote robotic surgery, autonomous vehicles, and high-definition augmented reality. These use-cases leverage the advanced capabilities of the new network. In contrast, sending basic text-only emails is a simple task that can be easily handled by older 2G or 3G networks.

150. (2) Signal response time delay
In mobile networking, latency refers to the time it takes for a data packet to travel from its source to its destination and back. Low latency is a hallmark of 5G, enabling near-instantaneous communication between devices. This is critical for time-sensitive applications like online gaming or real-time control of industrial machinery, where even a tiny delay.

151. (4) Unified Payments Interface
The Unified Payments Interface is a real-time payment system developed by the National Payments Corporation of India. It facilitates instant inter-bank peer-to-peer and person-to-merchant transactions through a single

Click Here to Buy book on Amazon

mobile application. By integrating multiple bank accounts into one platform, UPI has revolutionized digital finance in India, providing a seamless, secure, and highly efficient method for transferring funds electronically.

152. (1) I, II, III, and IV only
India's primary fund transfer systems, NEFT and RTGS, both operate 24x7x365 to facilitate digital payments. While NEFT settles transactions in half-hourly batches, RTGS provides continuous real-time processing for large-value transfers of ₹2 lakh and above. NEFT, however, does not have a minimum transfer limit, allowing it to be used for smaller transactions by individuals and businesses.

153. (3) IMPS is managed by the RBI, whereas NEFT is managed exclusively by private banks.
Both IMPS and NEFT are essential 24x7 digital payment systems in India, but they serve different needs. IMPS provides instant settlement for smaller amounts and is managed by the NPCI. NEFT handles batch-based transfers and is managed by the Reserve Bank of India. The claim that private banks manage NEFT exclusively is incorrect, as it is a.

154. (1) e-RUPI
e-RUPI is a cashless and contactless digital payment instrument introduced by the Government of India. It functions as a prepaid e-voucher that can be delivered to beneficiaries via SMS or QR codes. This system ensures that welfare benefits reach the intended recipient for a specific purpose without the need for a bank account, smartphone, or internet access.

155. (4) National Payments Corporation of India (NPCI)
The National Payments Corporation of India is an umbrella organization that operates and manages retail payment systems across India. Its portfolio includes innovative services like UPI, IMPS, RuPay, and AePS. By providing a robust and secure technological infrastructure, NPCI has been instrumental in driving the growth of digital payments and financial inclusion, making transactions accessible to millions.

156. (1) II, IV, I, III
A standard UPI transaction follows a logical sequence for security and accuracy. It begins with the user opening the app and identifying the receiver via QR or VPA. Next, the payment amount is entered, followed by the secure UPI PIN to authorize the transfer. Finally, the banks process the transaction, debiting the sender and crediting the receiver instantly.

157. (3) SWIFT Network
Digital payment methods like Paytm, Amazon Pay, and Mobikwik are retail-focused platforms that allow individuals to make daily transactions and payments easily. They are widely used for local peer-to-peer and merchant payments. SWIFT, however, is a global messaging network used by financial institutions to securely transmit information and instructions for large-scale international money transfers, serving an entirely different.

158. (4) Unique account identifier
A Virtual Payment Address is a unique identifier used in the UPI system that allows users to send and receive money without sharing their bank account number or IFSC code. Typically formatted like an email address, the VPA is linked directly to the user's bank account, providing a simple and secure way to identify the correct destination for.

159. (1) NEFT (National Electronic Funds Transfer)
The National Payments Corporation of India manages several modern retail payment systems, including IMPS, AePS, and FASTag. These systems are designed for high-volume, real-time digital transactions. NEFT, however, is a large-scale electronic funds transfer system owned and operated directly by the Reserve Bank of India. While it is a key part of the digital ecosystem, it falls.

160. (2) Zero merchant fees incentive
To promote the adoption of digital payments, the Government of India waived the Merchant Discount Rate on UPI and RuPay debit card transactions. This policy ensures that merchants are not charged any fees for accepting these types of payments, providing a strong incentive to move away from cash. This zero-cost model has been a major driver in the.

NODIA

161. (2) Mandatory privatization of all telecom networks
The Digital India programme is built on three core vision areas: providing digital infrastructure as a utility, ensuring governance and services on demand, and empowering citizens digitally. These goals aim to transform India into a digitally empowered society. The program does not mandate the privatization of all telecom networks, as it focuses on public-private partnerships and expanding connectivity.

162. (2) Statement I is correct, Statement II is incorrect
e-Mitra is a major e-governance initiative in Rajasthan that provides a wide range of government and private services to citizens through a unified platform. Contrary to the idea that it is only accessible at physical kiosks, e-Mitra also offers an online portal and mobile app for convenient access. This multi-channel approach ensures that services are available to.

163. (3) Documents in DigiLocker are not legally recognized under the IT Act 2000.
DigiLocker is a key Digital India initiative that provides citizens with secure cloud-based access to authentic digital documents, such as driving licenses and academic certificates. These digital versions are explicitly recognized as legally equivalent to original physical documents under the Information Technology Act, 2000. By integrating with Aadhaar, DigiLocker ensures secure authentication and reduces the need for physical.

164. (1) Both A and R are true and R is the correct explanation of A.
The implementation of e-office in government departments significantly increases transparency and accountability by digitizing the entire file-handling process. By creating electronic audit trails, the system ensures that the movement and history of every file can be tracked, reducing delays and potential corruption. This technological shift modernizes governance, making it more efficient and responsive to the needs.

165. (3) Unified Mobile Application for New-age Governance
UMANG is a comprehensive mobile application developed by the Ministry of Electronics and Information Technology to provide a single platform for accessing various central and state government services. The acronym stands for Unified Mobile Application for New-age Governance. By integrating diverse services into one app, UMANG simplifies the citizen's interaction with the government, promoting ease of.

166. (2) Government to Citizen (G2C)
The Government to Citizen model of e-governance refers to the digital delivery of public services and information directly to individual citizens. Examples include applying for birth certificates, paying taxes online, or accessing land records. This model aims to make government services more accessible, transparent, and efficient, reducing the need for citizens to visit physical government offices for.

167. (4) Jan Aadhaar - "One Number, One Card, One Identity" for accessing welfare schemes
Rajasthan has launched several specific e-governance initiatives, such as RajSampark for grievance redressal and RajeGyan for education. The Jan Aadhaar scheme is a particularly significant project that provides a unique "One Number, One Card, One Identity" for every family. This unified system simplifies access to various government welfare schemes and ensures that benefits are delivered accurately.

168. (1) A-ii, B-iv, C-i, D-iii
Digital India includes diverse initiatives with specific objectives: BharatNet provides broadband to rural areas, e-Hospital manages medical records, SWAYAM offers online education, and e-NAM provides a national platform for agricultural trade. Together, these programs address different aspects of digital empowerment and service delivery, creating a more connected and efficient nation through the strategic use of technology.

169. (3) An inter-departmental memo sent via e-Office
Government to Citizen services focus on providing direct benefits or information to the public, such as online tax payments, passport applications, or digital land records. These services enhance the citizen's experience with the government. An inter-departmental memo sent through an e-Office system is an example of

Downloaded from www.pdf.tube

Government to Government communication, as it involves internal administrative processes.

170. (1) Direct Benefit Transfer (DBT)
Direct Benefit Transfer is a government mechanism designed to transfer subsidies and welfare payments directly into the bank accounts of beneficiaries. By using the Aadhaar-linked payment system, DBT eliminates middlemen and leakages, ensuring that the full amount reaches the intended recipient. This transparent and efficient system has significantly improved the delivery of various social welfare schemes across.

171. (4) Microblogging
Twitter, now known as X, is a microblogging platform that allows users to post and interact with short messages called tweets. Unlike traditional blogs or long-form social networks, microblogging focuses on concise, real-time updates and public conversation. This format makes it a powerful tool for news dissemination, public discourse, and social interaction, distinguishing it from photo-sharing or.

172. (1) I and II only
Social media algorithms are designed to maximize engagement, often by feeding users content that aligns with their existing beliefs, which can create "echo chambers." This prioritization can sometimes lead to the amplification of misinformation. While these platforms offer connection, they do not universally enhance the psychological well-being of all users, as many experience negative effects like.

173. (3) They provide absolute immunity to social media platforms regardless of user content.
The IT Rules 2021 introduced significant regulations for social media intermediaries, including the appointment of compliance officers and grievance redressal mechanisms. They also require tracing the first originator of information in specific cases. Crucially, these rules do not provide absolute immunity; instead, platforms must follow "due diligence" requirements to maintain their protected status as intermediaries under.

174. (4) Virality
Virality refers to the rapid and widespread circulation of content across social media networks, driven by high user engagement and algorithmic promotion. When a post "goes viral," it reaches a vast audience in a very short time through sharing and interaction. This phenomenon can apply to news, entertainment, or marketing, and is a key goal for many content.

NODIA

175. (1) Ministry of Information and Broadcasting (MIB)
In accordance with the IT Rules 2021, the Ministry of Information and Broadcasting is the primary regulatory body responsible for overseeing the content ethics code for digital news and over-the-top streaming platforms. This oversight includes ensuring that these services follow age-rating guidelines and have a robust grievance redressal system. This role balances freedom of expression with.

176. (2) Synthetic AI based media
Deepfakes are synthetic media in which a person's likeness is replaced with someone else's using advanced artificial intelligence and machine learning techniques. This technology can create highly realistic but entirely fake videos or audio recordings. While it has creative uses, it also poses significant risks related to misinformation, identity theft, and the manipulation of public opinion on.

177. (1) Both Statement I and II are correct
Under the IT Rules 2021, significant social media intermediaries are required to maintain a physical contact address in India to ensure accountability. Additionally, the rules establish a three-tier grievance redressal mechanism for digital media, providing users with a clear path to report and resolve issues with content. These measures are designed to protect user rights and ensure.

178. (1) Oracle Database
Facebook, Instagram, and LinkedIn are all social media platforms designed for communication, networking, and content sharing among users. Each serves different social or professional purposes. Oracle Database, however, is a large-scale relational database management system used by organizations to store and manage structured data. It is a back-end enterprise software tool, not a social or digital.

179. (3) Intermediaries are generally exempt from liability
Section 79 of the IT Act, 2000 provides "Safe Harbor" protection, which generally exempts internet intermediaries from liability for third-party content hosted on their platforms. This protection is conditional on the intermediary following due diligence requirements and not initiating or modifying the transmission. This legal principle is essential for the operation of the internet, as it allows.

180. (4) Confirmation bias or filter bubble effect
Social media algorithms often create "filter bubbles" by showing users content that aligns with their past behavior and preferences. This can lead to confirmation bias, where individuals are only exposed to information that reinforces their existing views while being shielded from opposing perspectives. This psychological effect can narrow a user's worldview and contribute to social polarization by.

181. (3) Legal recognition of data
The primary objective of the Information Technology Act, 2000 was to provide legal recognition for transactions carried out through electronic data interchange and other means of electronic communication. By giving electronic records and digital signatures the same legal status as their physical counterparts, the Act established the foundation for e-commerce and e-governance in India, ensuring digital documents.

182. (4) I, II, III, and IV
The IT Act, 2000, along with its subsequent amendments, addresses several modern cybercrimes through specific sections. These include identity theft, cheating by personation, violation of privacy, and the severe offense of cyber terrorism. By providing a clear legal framework and penalties for these activities, the Act aims to protect individuals and the nation's digital infrastructure from malicious.

183. (4) It is currently active and heavily used by law enforcement agencies today.
Section 66A of the IT Act, which dealt with offensive messages, was a highly controversial provision. In the landmark Shreya Singhal case of 2015, the Supreme Court of India struck it down as unconstitutional, ruling that it violated the fundamental right to freedom of speech. Therefore, it is no longer active, and any continued use for arrests.

184. (1) Section 43A
Section 43A of the IT Act, 2000 mandates that corporate bodies possessing sensitive personal data must implement reasonable security practices. If a failure to protect this data causes a wrongful loss or gain, the company is liable to pay compensation to the affected person. This provision emphasizes the legal responsibility of organizations to maintain robust data protection standards.

185. (3) National security incident response
CERT-In is designated under the IT Act as the national agency for responding to computer security incidents. Its responsibilities include collecting and analyzing information on cyber threats, issuing alerts, and coordinating emergency response measures. By acting as a central point for cybersecurity intelligence, CERT-In plays a vital role in protecting India's critical information infrastructure from large-scale attacks.

186. (1) Punishment for publishing or transmitting obscene material - Section 67
The IT Act contains specific sections for different offenses. Section 67 provides punishment for publishing or transmitting obscene material in electronic form. Other sections handle hacking, unauthorized access, and cyber terrorism. Correctly matching these legal concepts with their provisions is essential for understanding how the law addresses various types of digital misconduct and protects the integrity of online.

187. (1) Both Statement I and II are correct
The IT Act, 2000 fundamentally changed the Indian legal landscape by amending other laws like the Evidence Act to recognize electronic records. More recently, the Digital Personal Data Protection Act of 2023 has introduced a more modern and comprehensive framework for data privacy, superseding older, less specific clauses in the IT Act. Both legislations are critical for India's.

Click Here to Buy book on Amazon

188. (1) A-ii, B-i, C-iv, D-iii
The IT Act organizes legal provisions by section: Section 43 handles damage to systems, Section 65 deals with tampering with source documents, Section 66B punishes receiving stolen resources, and Section 69 gives power for interception for national security. This structured approach allows for the precise prosecution of various digital crimes, ensuring that the legal system can effectively.

189. (3) Physical theft of a neighbor's desktop computer hardware from their home
The IT Act, 2000 is specifically designed to address crimes involving digital data and electronic communication, such as hacking, publishing child abuse material, or launching DDoS attacks. These are "cyber" crimes. The physical theft of computer hardware, however, is a traditional property crime covered under the Indian Penal Code, not the IT Act, as it involves.

190. (4) Legal validity equivalent
The Information Technology Act, 2000 provided the essential legal framework for electronic governance in India by granting digital signatures the same legal status as traditional handwritten signatures. This recognition ensures that electronic records and documents authenticated via digital signatures are legally binding. Consequently, this legislation paved the way for secure online transactions, electronic filing, and the growth of e-commerce.

191. (1) Real-world overlay vs fully immersive environment
Augmented Reality enhances the real world by overlaying digital information, such as images or data, onto a user's view of their physical surroundings. Virtual Reality, however, creates a completely immersive, computer-generated environment that replaces the real world entirely. While AR integrates digital elements into the existing environment, VR transports the user to an entirely different, simulated space.

192. (1) I, II, IV, and V only
Quantum computing utilizes qubits that can exist in multiple states simultaneously due to superposition and interact via entanglement. These systems perform calculations fundamentally differently from classical computers, posing a significant future threat to current encryption standards like RSA. While powerful, quantum computers face the major challenge of decoherence, where external interference disrupts the fragile quantum states needed for.

NODIA

193. (2) It is entirely owned and controlled by a single government entity globally.
The Metaverse is envisioned as a decentralized network of interconnected 3D virtual worlds where users can interact socially and economically. It often incorporates technologies like VR, AR, and blockchain-based digital assets. It is not owned or controlled by any single government or corporation; instead, it is expected to be a collaborative ecosystem developed by many different.

194. (1) Mixed Reality (MR)
Mixed Reality is a technology that blends the physical and digital worlds, allowing real and virtual objects to coexist and interact in real-time. A surgeon using a headset to project and interact with 3D MRI scans over a patient's body is a prime example. Unlike pure VR, MR keeps the user connected to the real environment while.

195. (3) Beyond classical capability
Quantum Supremacy is a milestone in computer science reached when a quantum computer performs a specific calculation that is practically impossible for the most powerful classical supercomputer to complete in a reasonable timeframe. This achievement demonstrates the fundamental power of quantum mechanics to solve certain types of complex problems far more efficiently than traditional binary-based computing architectures.

196. (4) 3D Printing (Additive Manufacturing)
3D printing, also known as additive manufacturing, is a process that creates three-dimensional solid objects by adding material layer by layer from a digital file. This is the opposite of traditional subtractive manufacturing, which involves cutting away material. 3D printing allows for the creation of complex shapes and customized parts, revolutionizing prototyping, manufacturing, and even medical.

197. (1) Both Statement I and II are correct
Quantum cryptography uses the laws of physics to provide exceptionally secure data transmission. A key method is Quantum Key Distribution, which relies on the fact that any attempt to observe or measure a quantum state will fundamentally alter it. This ensures that any eavesdropping is immediately detected, providing a level of security that is theoretically impossible to.

198. (2) Smart glass sensor overlays
Combining IoT and AR in industrial settings can significantly improve maintenance and efficiency. For example, a technician wearing smart glasses can see real-time data from IoT sensors overlaid directly onto the machinery they are repairing. This "heads-up" display provides vital information and instructions without the technician needing to look away from their work, reducing errors.

199. (4) Complete sensory visibility of the physical real-world environment
True Virtual Reality requires a head-mounted display and motion tracking sensors to create a fully immersive 360-degree digital environment. This immersive experience is achieved by completely blocking out the user's view of the physical real-world surroundings and replacing it with computer-generated visuals. If a user can still see the physical world clearly, it is not.

200. (1) Asymmetric encryption obsolescence
Mature quantum computing is expected to have a profound effect on global cybersecurity because its immense processing power could easily break the mathematical problems that protect current asymmetric encryption standards. This would make many existing security protocols obsolete, requiring the development and implementation of new, quantum-resistant cryptographic methods to protect sensitive data and.

NODIA

CHAPTER 03
Defence and Space Technology in India

1. The Defence Research and Development Organisation (DRDO) was established in which of the following years by amalgamating existing scientific establishments of the Indian military?
(1) 1948
(2) 1954
(3) 1958
(4) 1969
(5) Question not attempted

2. Match the following DRDO laboratories in List I with their respective locations in List II:
List I: (Laboratory)
A. Defence Metallurgical Research Laboratory (DMRL)
B. Combat Vehicles Research and Development Establishment (CVRDE)
C. Advanced Numerical Research and Analysis Group (ANURAG)
D. Defence Laboratory (DL)
List II: (Location)
i. Jodhpur
ii. Hyderabad
iii. Chennai
iv. Hyderabad
(1) A-ii, B-iii, C-iv, D-i
(2) A-i, B-ii, C-iii, D-iv
(3) A-iv, B-i, C-ii, D-iii
(4) A-iii, B-iv, C-i, D-ii
(5) Question not attempted

3. Arrange the following major defense and space milestones in chronological order of their inception or occurrence:
I. Establishment of DRDO
II. First Pokhran Nuclear Test
III. Establishment of ISRO
IV. Launch of IGMDP
Which of the above is the correct chronological sequence?
(1) I, II, III, IV
(2) I, III, II, IV
(3) III, I, IV, II
(4) II, I, III, IV
(5) Question not attempted

4. Which of the following is the official motto of the Defence Research and Development Organisation (DRDO)?
(1) Nabha Sparsham Deeptam
(2) Vayam Rakshamah
(3) Dharmo Rakshati Rakshitah
(4) Balasya Mulam Vigyanam
(5) Question not attempted

5. Identify the incorrect statement regarding the role and functioning of DRDO.
(1) It operates under the administrative control of the Ministry of Defence, Government of India.
(2) It advises the government on scientific and technical aspects of military equipment and logistics.
(3) Nodal agency for designing commercial passenger aircraft.
(4) It works in strategic collaboration with academia and private industry for modern defence technology.
(5) Question not attempted

6. What is the primary function of the Technology Development Fund (TDF) scheme executed by DRDO?
(1) To procure advanced foreign military technology for the immediate use of the Indian Armed Forces.
(2) To support MSMEs and startups in achieving self-reliance in defence technology.
(3) To fund the post-retirement pensions and welfare schemes for veteran DRDO scientists.
(4) To finance the establishment and maintenance of new DRDO testing ranges in overseas territories.
(5) Question not attempted

7. Consider the following pair:

Downloaded from www.pdf.tube

System: NETRA
Type of Technology: Airborne Early Warning and Control (AEW&C) System
Is this pair correctly matched?
(1) No, NETRA is a strategic nuclear submarine class operated by the Indian Navy.
(2) No, NETRA is a long-range surface-to-air missile system for air defence.
(3) No, NETRA is an advanced autonomous unmanned ground vehicle for surveillance.
(4) Yes, it is an indigenous AEW&C system developed by DRDO.
(5) Question not attempted

8. Which of the following best defines a Technology Demonstration Vehicle in the context of DRDO's project classifications?
(1) A prototype used to validate complex new technologies before formal weapon system integration.
(2) A combat vehicle ready for immediate mass production and induction into the frontline army units.
(3) A specialized vehicle imported from foreign allies to train Indian scientists on international standards.
(4) A retired weapon system or vehicle displayed in military museums for public education and heritage.
(5) Question not attempted

9. DRDO's spin-off technologies are those that:
(1) Are developed and sold exclusively to foreign space agencies for satellite launches.
(2) Have failed rigorous military trials and are discarded from the official inventory.
(3) Are military-developed technologies adapted for civilian and societal benefits.
(4) Involve spinning mechanisms specifically for missile gyroscopes and inertial navigation only.
(5) Question not attempted

10. Among the following, which is not a direct responsibility of the Department of Defence Research and Development (DoDRD)?
(1) Tactical command of the Armed Forces during wartime.
(2) Formulating strategic research programs for the modernization of the armed forces.
(3) Administering the various laboratories and establishments under the DRDO.
(4) Providing scientific advice and technical guidance to the Union Defence Minister.
(5) Question not attempted

11. Consider the following statements regarding the Integrated Guided Missile Development Programme (IGMDP):
I. It was launched in 1983 under the leadership of Dr. A.P.J. Abdul Kalam.
II. The programme was formally declared successful and completed in 2008.
III. It included the development of the BrahMos supersonic cruise missile.
Which of the above statement(s) is/are correct?
(1) I and II only
(2) II and III only
(3) I and III only
(4) I, II and III
(5) Question not attempted

NODIA

12. The following question consists of two statements, Assertion (A) and Reason (R). Answer the question by selecting the appropriate option.
Assertion (A): The Integrated Guided Missile Development Programme (IGMDP) was initiated by the Indian government.
Reason (R): International technology denial regimes like the MTCR restricted India's access to advanced missile technology.
(1) Both A and R are true and R is the correct explanation of A.
(2) Both A and R are true but R is not the correct explanation of A.
(3) A is true but R is false.
(4) A is false but R is true.
(5) Question not attempted

13. Which of the following acronyms correctly represents the five core missile systems developed under the IGMDP?
(1) PRATAP (Prithvi, Rustom, Agni, Trishul, Akash, Pinaka)
(2) PARTH (Prithvi, Agni, Rustom, Trishul, Helina)
(3) PATNA (Prithvi, Agni, Trishul, Nag, Akash)
(4) PAWAN (Prithvi, Akash, Astra, Nirbhay)
(5) Question not attempted

14. Which statement about the IGMDP is correct?

(1) It was a project jointly funded and supervised by the United Nations Security Council.
(2) It focused exclusively on air-to-air missiles for the Indian Air Force interceptor fleet.
(3) It relied heavily on transferred technology and blueprints from the United States of America.
(4) It achieved simultaneous development of strategic and tactical missiles.
(5) Question not attempted

15. Identify the incorrect statement regarding the missiles of the IGMDP.
(1) Trishul is an intercontinental ballistic missile.
(2) Prithvi is a short-range surface-to-surface ballistic missile.
(3) Akash is a medium-range surface-to-air missile.
(4) Nag is a third-generation anti-tank guided missile.
(5) Question not attempted

16. The necessity of IGMDP was most strongly reinforced by which international treaty's limitations on India?
(1) Nuclear Non-Proliferation Treaty (NPT)
(2) Missile Technology Control Regime (MTCR)
(3) Comprehensive Nuclear-Test-Ban Treaty (CTBT)
(4) Wassenaar Arrangement
(5) Question not attempted

17. Who among the following is widely known as the Missile Man of India for his pivotal role in steering the IGMDP?
(1) Dr. Vikram Sarabhai
(2) Dr. A.P.J. Abdul Kalam
(3) Dr. Homi J. Bhabha
(4) Dr. Satish Dhawan
(5) Question not attempted

18. Consider the following statements:
Statement I: The IGMDP aimed to achieve self-reliance in the field of missile technology.
Statement II: The programme was shut down in 1990 due to a lack of funding.
Which of the above statement(s) is/are correct?
(1) Statement I is correct but Statement II is incorrect.
(2) Statement II is correct but Statement I is incorrect.
(3) Both statements are correct.
(4) Both statements are incorrect.
(5) Question not attempted

19. What was the most appropriate strategic impact of the IGMDP on India's defence posture?
(1) It resulted in a complete and permanent ban on all types of foreign arms imports.
(2) It shifted India's entire defence focus and budget to civilian space exploration projects.
(3) It established a credible indigenous deterrence capability against regional adversaries.
(4) It led to India's immediate and unconditional inclusion in the UN Security Council as a member.
(5) Question not attempted

20. Which of the following missiles was developed independently and is the odd one out from the IGMDP family?
(1) Agni
(2) Prithvi
(3) Akash
(4) Nirbhay
(5) Question not attempted

21. Consider the following statements regarding the Agni missile series:
I. Agni-I is a short-range ballistic missile.
II. Agni-II has a range of more than 5000 km.
III. Agni-V is an Intercontinental Ballistic Missile (ICBM).
IV. The Agni series relies predominantly on liquid propellant for all its stages.
Which of the above statement(s) is/are correct?
(1) I and III only
(2) II and IV only
(3) I, II and III only
(4) I, III and IV only
(5) Question not attempted

22. Match the Agni missile variants in List I with their approximate operational ranges in List II:
List I: (Missile Variant)
A. Agni-I
B. Agni-III
C. Agni-IV
D. Agni-V
List II: (Operational Range)

Click Here to Buy book on Amazon

STUDYING FROM PDFs?

THINK AGAIN.

If you are studying only from PDFs,
you are wasting valuable time.

Research shows that learning from

PRINTED BOOKS has up to

4× HIGHER RETENTION

than studying from screens.

PRINT BOOK = BETTER MEMORY

PDF = LOWER RETENTION

Those who study from **PRINTED BOOKS**
move **AHEAD.**

Others are left **BEHIND**
in competition.

In competitive exams,
being average is not enough.

STAY ONE STEP AHEAD.

i. 3,000 to 3,500 km
ii. 700 to 900 km
iii. Over 5,000 km
iv. 3,500 to 4,000 km
(1) A-ii, B-i, C-iv, D-iii
(2) A-i, B-ii, C-iii, D-iv
(3) A-ii, B-iv, C-i, D-iii
(4) A-iv, B-iii, C-ii, D-i
(5) Question not attempted

23. Agni-V is classified under which category of missiles based on its range?
(1) Short-Range Ballistic Missile (SRBM)
(2) Medium-Range Ballistic Missile (MRBM)
(3) Intermediate-Range Ballistic Missile (IRBM)
(4) Intercontinental Ballistic Missile (ICBM)
(5) Question not attempted

24. Consider the following statements:
Statement I: Early variants of the Agni series used a combination of solid and liquid propellants.
Statement II: The modern Agni-V missile utilizes a three-stage solid-fueled engine.
Which of the above statement(s) is/are correct?
(1) Statement I is correct but Statement II is incorrect.
(2) Statement II is correct but Statement I is incorrect.
(3) Both statements are correct.
(4) Both statements are incorrect.
(5) Question not attempted

25. Which of the following pairs concerning the Agni Prime (Agni-P) missile is correctly matched?
(1) Agni-P : Liquid-fueled, slow-launch ICBM designed for static silos.
(2) Agni-P : Submarine-launched cruise missile for stealthy naval operations.
(3) Agni-P : Canisterised, highly maneuverable next-generation ballistic missile.
(4) Agni-P : Anti-satellite kinetic weapon for destroying low earth orbit satellites.
(5) Question not attempted

26. Which of the following statements about the Agni missile series is incorrect?
(1) The Agni series was developed exclusively by foreign defense contractors.
(2) Agni missiles are capable of carrying nuclear warheads.
(3) Agni-V provides India with second-strike capability.
(4) Agni-IV is equipped with state-of-the-art avionics and ring laser gyroscopes.
(5) Question not attempted

27. The payload capacity of the Agni-V missile is approximately:
(1) 100 kg
(2) 500 kg
(3) 1,500 kg
(4) 15,000 kg
(5) Question not attempted

28. In the context of India's recent test of the Agni-V missile (Mission Divyastra), what does the application of MIRV technology enable?
(1) The missile can be launched from a submerged submarine.
(2) A single missile can carry multiple nuclear warheads directed at different targets.
(3) The missile can be recalled mid-flight.
(4) The missile travels purely at hypersonic speeds within the atmosphere like a cruise missile.
(5) Question not attempted

NODIA

29. By definition, what primary characteristic classifies the Agni series as ballistic missiles rather than cruise missiles?
(1) They fly at subsonic speeds throughout their entire flight duration.
(2) They are guided continuously by an operator until they hit the intended target.
(3) They follow a sub-orbital parabolic flightpath, exiting and re-entering the atmosphere.
(4) They rely on wings for aerodynamic lift during the entire duration of their flight.
(5) Question not attempted

30. What is the operational effect of canisterising the Agni-V missile?
(1) It reduces the missile's range significantly due to the added weight of the container.
(2) It exposes the missile to harsher environmental conditions during storage and transport.
(3) It restricts the missile to silo-based launches only, preventing any mobile deployment.

(4) It improves launch readiness and allows deployment from mobile platforms.
(5) Question not attempted

31. Consider the following statements regarding Prithvi, Akash, Nag, and Trishul missiles:
I. Prithvi is India's first indigenously built ballistic missile.
II. Akash can engage multiple aerial targets simultaneously.
III. Nag utilizes an infrared imaging seeker for 'fire-and-forget' capability.
IV. Trishul was successfully inducted and is currently the primary air defense missile of the Indian Navy.
V. Both Akash and Trishul were conceptualized as surface-to-air missiles.
Which of the above statement(s) is/are correct?
(1) I, II, III, and V only
(2) I, II, IV, and V only
(3) II, III, IV, and V only
(4) I, III, IV, and V only
(5) Question not attempted

32. The Prithvi missile system is fundamentally a:
(1) Surface-to-Air Missile (SAM)
(2) Surface-to-Surface Battlefield Missile
(3) Air-to-Air Missile (AAM)
(4) Anti-Radiation Missile
(5) Question not attempted

33. The Akash missile system is deployed to counter which of the following threats?
(1) Enemy main battle tanks
(2) Enemy aircraft and aerial drones
(3) Submerged enemy submarines
(4) Heavily fortified underground bunkers
(5) Question not attempted

34. Which of the following is a correct statement about the Nag missile?
(1) It is a third-generation anti-tank guided missile (ATGM).
(2) It is a strategic intercontinental ballistic missile.
(3) It must be continuously guided by a laser wire throughout its flight.
(4) It was developed solely for the Indian Navy.
(5) Question not attempted

35. What was the intended range and purpose of the Trishul missile as defined under the IGMDP?
(1) Long-range surface-to-surface strike against strategic enemy infrastructure.
(2) Medium-range anti-submarine warfare for deep-sea naval protection.
(3) Short-range quick reaction surface-to-air engagement.
(4) Beyond visual range air-to-air combat for modern fighter aircraft.
(5) Question not attempted

36. The sustained supersonic speed of the Akash missile during its flight is facilitated by the application of which technology?
(1) Scramjet propulsion
(2) Ion propulsion
(3) Liquid hydrogen core stage
(4) Ramjet propulsion
(5) Question not attempted

37. Consider the following statements:
Statement I: HELINA is a helicopter-launched version of the Nag missile.
Statement II: The IAF version of HELINA is designated as Dhruvastra.
Which of the above statement(s) is/are correct?
(1) Statement I is correct but Statement II is incorrect.
(2) Statement II is correct but Statement I is incorrect.
(3) Both statements are correct.
(4) Both statements are incorrect.
(5) Question not attempted

38. Which of the original five IGMDP missile projects was officially closed/delinked without entering full-scale operational service?
(1) Prithvi
(2) Trishul
(3) Akash
(4) Nag
(5) Question not attempted

39. Identify the correctly matched pair regarding the user variants of the Prithvi missile:
(1) Prithvi-I : Indian Air Force
(2) Prithvi-II : Indian Army
(3) Prithvi-IV : Indian Coast Guard
(4) Prithvi-III : Indian Navy (Dhanush)
(5) Question not attempted

Downloaded from www.pdf.tube

40. The most appropriate strategic role of the Akash weapon system is to provide:
(1) Area air defence for mobile army formations and vulnerable areas.
(2) Deep penetration strike capabilities inside enemy territory.
(3) Coastal surveillance and intercepting enemy warships.
(4) Strategic nuclear deterrence against distant nations.
(5) Question not attempted

41. The BrahMos supersonic cruise missile is a joint venture between the DRDO of India and which foreign entity?
(1) NASA, United States
(2) Dassault Aviation, France
(3) NPO Mashinostroyenia, Russia
(4) Israel Aerospace Industries, Israel
(5) Question not attempted

42. Match the following platforms in List I with their respective BrahMos integration capabilities in List II:
List I: (Platform)
A. Surface Ships
B. Submarines
C. Aircraft
D. Land Mobile Launchers
List II: (Integration Capability)
i. Integrated on Su-30 MKI
ii. Fired from vertical launch systems or inclined launchers
iii. Launched via autonomous heavy-duty trucks
iv. Can be launched submerged from torpedo tubes
(1) A-ii, B-iv, C-i, D-iii
(2) A-i, B-ii, C-iii, D-iv
(3) A-iv, B-iii, C-ii, D-i
(4) A-ii, B-i, C-iv, D-iii
(5) Question not attempted

43. Arrange the following aerodynamic flight speeds in order from slowest to fastest:
I. Supersonic
II. Subsonic
III. Hypersonic
IV. Transonic
Which of the following is the correct order?
(1) II, IV, I, III
(2) II, I, IV, III
(3) IV, II, I, III
(4) I, II, III, IV
(5) Question not attempted

44. The standard BrahMos cruise missile is known to cruise at a maximum speed of approximately:
(1) Mach 0.8
(2) Mach 1.2
(3) Mach 2.8
(4) Mach 5.0
(5) Question not attempted

45. The BrahMos missile's capability to maintain sustained high-speed flight within the atmosphere relies on the concept of:
(1) A two-stage solid rocket booster system for the entire duration of flight.
(2) A fully cryogenic propulsion engine similar to those used in heavy space rockets.
(3) Solid propellant booster followed by a liquid ramjet engine.
(4) A purely ballistic trajectory requiring no sustained propulsion after the launch phase.
(5) Question not attempted

46. What was the direct effect of India joining the Missile Technology Control Regime (MTCR) on the BrahMos programme?
(1) The programme was immediately suspended due to new international regulations.
(2) It mandated the immediate transfer of BrahMos technology to all other MTCR members.
(3) It restricted the operational speed of the missile to subsonic levels for safety.
(4) It allowed India to extend the range beyond 300 km.
(5) Question not attempted

47. Which of the following statements regarding the BrahMos missile is incorrect?
(1) It cannot be launched from underwater platforms.
(2) It operates on the "fire and forget" principle.
(3) It maintains a low radar signature.
(4) It cannot be intercepted by any current air defense system.
(5) Question not attempted

NODIA

48. By definition, how does a cruise missile like BrahMos differ from a ballistic missile?
(1) A cruise missile flies entirely outside the Earth's atmosphere during its cruise phase.
(2) It stays in the atmosphere and flies in a guided path.
(3) A cruise missile cannot carry conventional warheads and is restricted to nuclear payloads only.
(4) A cruise missile relies solely on gravity for its movement during the terminal descent phase.
(5) Question not attempted

49. The name "BrahMos" is derived from the combination of the names of which two rivers?
(1) Brahmani and Moscow
(2) Brahmaputra and Moskva
(3) Brahmaputra and Mississippi
(4) Beas and Moskva
(5) Question not attempted

50. Which of the following countries has officially signed a contract to purchase the BrahMos missile system from India?
(1) Philippines
(2) Vietnam
(3) Indonesia
(4) Malaysia
(5) Question not attempted

51. Consider the following statements regarding India's first nuclear test in 1974:
I. The codename for the test was "Smiling Buddha".
II. It was conducted at the Pokhran test range in Rajasthan.
III. It was officially characterized by the Indian government as a "Peaceful Nuclear Explosion" (PNE).
Which of the above statement(s) is/are correct?
(1) I and II only
(2) II and III only
(3) I and III only
(4) I, II, and III
(5) Question not attempted

52. The following question consists of two statements, Assertion (A) and Reason (R). Answer the question by selecting the appropriate option.
Assertion (A): Following the Pokhran-II tests in 1998, several countries including the USA and Japan imposed economic sanctions on India.
Reason (R): The tests were viewed by these nations as a violation of the international non-proliferation regime, despite India not being a signatory to the NPT.
(1) Both A and R are true and R is the correct explanation of A.
(2) Both A and R are true but R is not the correct explanation of A.
(3) A is true but R is false.
(4) A is false but R is true.
(5) Question not attempted

53. On which exact date did India conduct its first successful nuclear bomb test in Pokhran?
(1) May 11, 1974
(2) May 18, 1974
(3) May 11, 1998
(4) May 13, 1998
(5) Question not attempted

54. The series of five nuclear bomb test explosions conducted by India in May 1998 was collectively codenamed:
(1) Operation Meghdoot
(2) Operation Shakti
(3) Operation Vijay
(4) Operation Parakram
(5) Question not attempted

55. Consider the following statements regarding the 1998 Pokhran tests:
Statement I: The tests included a thermonuclear device (hydrogen bomb).
Statement II: The tests established India as a declared nuclear-weapon state.
Which of the above statement(s) is/are correct?
(1) Statement I is correct but Statement II is incorrect.
(2) Statement II is correct but Statement I is incorrect.
(3) Both statements are correct.
(4) Both statements are incorrect.
(5) Question not attempted

56. The application of the term "Peaceful Nuclear Explosion" (PNE) to the 1974 test was meant to convey that:
(1) The technology was for non-military uses

Click Here to Buy book on Amazon

like mining.
(2) The explosion produced absolutely no harmful radiation or fallout for the surrounding environment.
(3) The bomb was detonated in deep space to avoid any potential harm to the Earth's atmosphere.
(4) The device was a failed weapon test that did not meet the expected yield for military purposes.
(5) Question not attempted

57. Which of the following countries did NOT impose immediate economic sanctions on India following the 1998 nuclear tests?
(1) United States
(2) Japan
(3) France
(4) Canada
(5) Question not attempted

58. Identify the correctly matched pair of the scientific leader and their associated nuclear test:
(1) Dr. Raja Ramanna - Pokhran-I (1974)
(2) Dr. A.P.J. Abdul Kalam - Pokhran-I (1974)
(3) Dr. R. Chidambaram - Headed ISRO during Pokhran-II
(4) Dr. Homi Bhabha - Designed the Pokhran-II thermonuclear device
(5) Question not attempted

59. What was the most appropriate outcome of the 1998 Pokhran tests on India's strategic policy?
(1) India immediately signed the NPT as a recognized nuclear weapon state.
(2) India completely disarmed its conventional military forces in favor of nuclear arms.
(3) India joined NATO as an allied member to receive international security guarantees.
(4) India announced a doctrine of "No First Use."
(5) Question not attempted

60. What was a major long-term diplomatic effect resulting from India's de facto nuclear weapon status post-1998?
(1) Permanent and immediate removal of India from all United Nations committees and bodies.
(2) Signing of the Indo-US Civil Nuclear Agreement.
(3) Complete and total isolation from all global trade markets that continues to this very day.
(4) India being forced by the international community to surrender its nuclear weapons to the IAEA.
(5) Question not attempted

61. Consider the following components regarding India's Nuclear Doctrine:
I. No First Use (NFU) policy.
II. Credible Minimum Deterrence.
III. Massive retaliation against a first strike.
IV. Pre-emptive nuclear strikes on non-nuclear weapon states.
Which of the above statement(s) is/are correct?
(1) I, II, and IV only
(2) I, II, and III only
(3) II, III, and IV only
(4) I, III, and IV only
(5) Question not attempted

62. Match the terms in List I related to India's Nuclear Doctrine with their definitions in List II:
List I: (Term)
A. No First Use
B. Credible Minimum Deterrence
C. Massive Retaliation
D. Nuclear Command Authority
List II: (Definition)
i. Maintaining a sufficient but not excessive arsenal to prevent an attack.
ii. A strike resulting in unacceptable damage to the aggressor.
iii. The body authorized to make decisions regarding nuclear weapons usage.
iv. Commitment not to use nuclear weapons as a primary means of warfare.
(1) A-iv, B-i, C-ii, D-iii
(2) A-i, B-ii, C-iii, D-iv
(3) A-iv, B-ii, C-i, D-iii
(4) A-ii, B-i, C-iv, D-iii
(5) Question not attempted

63. In which year did the Government of India officially adopt and publish its formal Nuclear Doctrine?
(1) 1974
(2) 1998

Downloaded from www.pdf.tube

(3) 1999
(4) 2003
(5) Question not attempted

64. According to India's Nuclear Doctrine, the concept of "Credible Minimum Deterrence" implies:
(1) India will maintain a massive stockpile equivalent to the USA and Russia to ensure global parity.
(2) A survivable arsenal capable of inflicting unacceptable damage.
(3) India will only possess conventional weapons and phase out all nuclear capabilities over time.
(4) India relies entirely on other nuclear-armed nations for a security umbrella during conflicts.
(5) Question not attempted

65. Consider the following statements:
Statement I: India's No First Use policy is absolute and applies to all types of attacks.
Statement II: India retains the option to use nuclear weapons in response to a major attack by biological or chemical weapons.
Which of the above statement(s) is/are correct?
(1) Statement I is correct but Statement II is incorrect.
(2) Statement II is correct but Statement I is incorrect.
(3) Both statements are correct.
(4) Both statements are incorrect.
(5) Question not attempted

66. Based on the concept of the Nuclear Command Authority (NCA) of India, which body executes the directives given by the Political Council?
(1) The Executive Council
(2) The Cabinet Committee on Security
(3) The Strategic Forces Command
(4) The Ministry of External Affairs
(5) Question not attempted

67. Who among the following chairs the Political Council of India's Nuclear Command Authority, making the final decision to authorize a nuclear strike?
(1) President of India
(2) Chief of Defence Staff
(3) Prime Minister of India
(4) National Security Advisor
(5) Question not attempted

68. Which of the following statements correctly describes the role of the Strategic Forces Command (SFC)?
(1) It is responsible for negotiating nuclear treaties.
(2) It oversees the manufacturing of civilian nuclear reactors.
(3) It provides conventional infantry support during border skirmishes.
(4) It manages and administers all strategic nuclear forces and delivery systems.
(5) Question not attempted

69. Which of the following is an incorrect statement regarding India's stated nuclear doctrine?
(1) Nuclear retaliation to a first strike will be massive.
(2) Nuclear weapons will not be used against non-nuclear weapon states.
(3) India commits to lowering the threshold for nuclear weapons usage in tactical border conflicts.
(4) India remains committed to the goal of a nuclear-weapon-free world through global, verifiable disarmament.
(5) Question not attempted

70. Which official chairs the Executive Council of the Nuclear Command Authority (NCA)?
(1) Prime Minister
(2) National Security Advisor
(3) Chief of Army Staff
(4) Defence Minister
(5) Question not attempted

NODIA

71. Consider the following statements about INS Vikrant:
I. It is India's first indigenously designed and built aircraft carrier.
II. It was constructed by Mazagon Dock Limited.
III. It operates on a STOBAR (Short Take-Off But Arrested Recovery) configuration.
IV. It is capable of operating MiG-29K fighter jets.
V. It features a ski-jump for launching aircraft.
Which of the above statement(s) is/are correct?
(1) I, II, III, and V only

(2) I, III, IV, and V only
(3) II, III, IV, and V only
(4) I, II, IV, and V only
(5) Question not attempted

72. What designation was given to INS Vikrant during its design and construction phase?
(1) IAC-1 (Indigenous Aircraft Carrier 1)
(2) Project 75I
(3) ATV (Advanced Technology Vessel)
(4) Project 15B
(5) Question not attempted

73. Which Indian shipyard is responsible for the construction of INS Vikrant?
(1) Garden Reach Shipbuilders & Engineers, Kolkata
(2) Goa Shipyard Limited
(3) Cochin Shipyard Limited, Kochi
(4) Hindustan Shipyard Limited, Visakhapatnam
(5) Question not attempted

74. Consider the following statements:
Statement I: INS Vikrant uses the CATOBAR system featuring steam catapults to launch its aircraft.
Statement II: The ship has an angled flight deck equipped with arresting wires for aircraft recovery.
Which of the above statement(s) is/are correct?
(1) Statement I is correct but Statement II is incorrect.
(2) Statement II is correct but Statement I is incorrect.
(3) Both statements are correct.
(4) Both statements are incorrect.
(5) Question not attempted

75. The conceptual application of the STOBAR system on INS Vikrant primarily dictates that the fighter aircraft operating from it must:
(1) Possess vertical take-off and landing (VTOL) capabilities only for all mission types.
(2) Be launched using an electromagnetic catapult (EMALS) integrated into the flight deck.
(3) Be lightweight reconnaissance drones exclusively to maintain safety standards.
(4) Rely on a high thrust-to-weight ratio to launch off the ski-jump.
(5) Question not attempted

76. Which of the following aircraft is NOT planned or currently capable of operating from INS Vikrant?
(1) MiG-29K
(2) Boeing C-17 Globemaster
(3) LCA Navy (Tejas naval variant)
(4) Kamov Ka-31 helicopters
(5) Question not attempted

77. Which of the following pairs concerning the technical specifications of INS Vikrant is correctly matched?
(1) Maximum speed : 15 knots
(2) Propulsion type : Nuclear reactor
(3) Full load displacement : Approx. 45,000 tonnes
(4) Endurance : 100 nautical miles
(5) Question not attempted

78. By definition, what does the Sanskrit word "Vikrant", after which the carrier is named, mean?
(1) Victorious
(2) Invincible
(3) Destroyer
(4) Courageous
(5) Question not attempted

79. What is the operational effect of inducting INS Vikrant on the Indian Navy's maritime strategy?
(1) It provides the capability to deploy a carrier battle group on both seaboards.
(2) It shifts the Navy from a blue-water to a brown-water force focused entirely on coastal patrol missions.
(3) It restricts naval operations exclusively to the Bay of Bengal region for the foreseeable future.
(4) It phases out the need for nuclear submarines entirely by providing a superior surface alternative.
(5) Question not attempted

80. What is the most appropriate strategic significance of the indigenous construction of INS Vikrant?
(1) It guarantees India a permanent and veto-enabled seat in the UN Security Council immediately.

Click Here to Buy book on Amazon

(2) India can now design and build complex aircraft carriers indigenously.
(3) It completely and permanently removes India's reliance on foreign oil imports for naval operations.
(4) It proves that steam catapults are obsolete and unnecessary in the context of modern naval warfare.
(5) Question not attempted

81. Consider the following statements regarding the Arjun Main Battle Tank (MBT):
I. It was designed and developed by the DRDO's Combat Vehicles Research and Development Establishment (CVRDE).
II. It features indigenous Kanchan composite armour.
III. The Arjun Mk-1A is a lighter version of the tank designed specifically for high-altitude warfare.
Which of the above statement(s) is/are correct?
(1) I and II only
(2) II and III only
(3) I and III only
(4) I, II and III
(5) Question not attempted

82. Match the components of the Arjun MBT in List I with their key features in List II:
List I: (Component)
A. Main armament
B. Armour
C. Engine
D. Secondary armament
List II: (Key Feature)
i. Kanchan modular composite
ii. 120 mm rifled gun
iii. 12.7 mm anti-aircraft machine gun
iv. MTU diesel engine
(1) A-ii, B-i, C-iv, D-iii
(2) A-i, B-ii, C-iii, D-iv
(3) A-iv, B-iii, C-i, D-ii
(4) A-ii, B-iv, C-i, D-iii
(5) Question not attempted

83. Arrange the following main battle tanks chronologically in the order of their introduction into the Indian military's operational history:
I. T-90 Bhishma
II. Vijayanta
III. Arjun Mk-1
IV. T-72 Ajeya
Which of the following is the correct order?
(1) II, IV, I, III
(2) II, IV, III, I
(3) IV, II, III, I
(4) II, III, IV, I
(5) Question not attempted

84. Which statement correctly identifies the developing agency of the Arjun MBT?
(1) Hindustan Aeronautics Limited (HAL)
(2) Ordnance Factory Board (OFB) independently
(3) BEML Limited
(4) Combat Vehicles Research and Development Establishment (CVRDE) under DRDO
(5) Question not attempted

85. The Arjun Mk-1 tank falls under which weight category of battle tanks?
(1) Light tank (under 25 tons)
(2) Medium tank (around 40 tons)
(3) Heavy tank (over 65 tons)
(4) Amphibious light tank
(5) Question not attempted

NODIA

86. Consider the following statements:
Statement I: Kanchan armour used in the Arjun tank is a type of explosive reactive armour (ERA) exclusively.
Statement II: Kanchan armour is an advanced composite armour that provides protection against both kinetic energy and chemical energy rounds.
Which of the above statement(s) is/are correct?
(1) Statement I is correct but Statement II is incorrect.
(2) Statement II is correct but Statement I is incorrect.
(3) Both statements are correct.
(4) Both statements are incorrect.
(5) Question not attempted

87. The 120mm rifled gun of the Arjun MBT fires a specialized anti-tank kinetic energy penetrator round conceptually known as:
(1) High-Explosive Squash Head (HESH)
(2) Anti-Tank Guided Missile (ATGM)
(3) High-Explosive Anti-Tank (HEAT)
(4) Fin Stabilised Armour Piercing Discarding Sabot (FSAPDS)

(5) Question not attempted

88. Which of the following is an incorrect statement regarding the upgrades in the Arjun Mk-1A variant compared to the Mk-1?
(1) Its overall weight has been significantly reduced to 50 tons.
(2) It features an upgraded Hunter-Killer capability.
(3) It has improved mobility with a redesigned hydropneumatic suspension system.
(4) It incorporates enhanced mine ploughs.
(5) Question not attempted

89. The propulsion for the original Arjun Mk-1 tank is provided by a diesel engine originally sourced from which country?
(1) Russia
(2) United States
(3) Germany
(4) France
(5) Question not attempted

90. Which of the following is the odd one out as it is not a tank in service with or developed by the Indian Army?
(1) Leopard
(2) Bhishma
(3) Ajeya
(4) Zorawar
(5) Question not attempted

91. Consider the following statements regarding the Light Combat Aircraft (LCA) Tejas:
I. It has a tailless delta wing design.
II. It is a twin-engine heavy fighter aircraft.
III. It features a quadruplex fly-by-wire flight control system.
Which of the above statement(s) is/are correct?
(1) I and II only
(2) I and III only
(3) II and III only
(4) I, II, and III
(5) Question not attempted

92. The following question consists of two statements, Assertion (A) and Reason (R). Answer the question by selecting the appropriate option.
Assertion (A): The LCA Tejas is designed with a statically unstable aerodynamic configuration.
Reason (R): Static instability intentionally enhances the aircraft's maneuverability and agility during combat.
(1) Both A and R are true and R is the correct explanation of A.
(2) Both A and R are true but R is not the correct explanation of A.
(3) A is true but R is false.
(4) A is false but R is true.
(5) Question not attempted

93. The LCA Tejas was primarily designed by which agency?
(1) Hindustan Aeronautics Limited (HAL)
(2) Indian Space Research Organisation (ISRO)
(3) Aeronautical Development Agency (ADA)
(4) Defence Space Agency (DSA)
(5) Question not attempted

94. What specific technology manages the inherently unstable design of the LCA Tejas to keep it flyable?
(1) Mechanical pulley systems
(2) Thrust vectoring nozzles
(3) Variable-sweep wings
(4) Fly-by-wire digital flight control system
(5) Question not attempted

95. Consider the following statements:
Statement I: A large portion of the LCA Tejas airframe is built using carbon-fibre composite materials.
Statement II: The use of composite materials increases the aircraft's weight but reduces its radar signature.
Which of the above statement(s) is/are correct?
(1) Statement I is correct but Statement II is incorrect.
(2) Statement II is correct but Statement I is incorrect.
(3) Both statements are correct.
(4) Both statements are incorrect.
(5) Question not attempted

96. The conceptual application of a glass cockpit in the LCA Tejas refers to:
(1) A cockpit canopy made entirely of bulletproof glass for pilot protection.
(2) Electronic displays rather than traditional analog dials.
(3) A transparent floor designed specifically

Downloaded from www.pdf.tube

for enhanced pilot visibility in a downward direction.
(4) A cockpit designed without any metal structural supports to maximize the pilot's field of view.
(5) Question not attempted

97. Which of the following variants is NOT associated with the LCA Tejas development programme?
(1) Tejas Mk-1A
(2) Tejas Strategic Bomber
(3) Tejas Trainer
(4) LCA Navy (Twin Engine Deck Based Fighter precursor)
(5) Question not attempted

98. Identify the correctly matched pair regarding the systems on the LCA Tejas Mk-1A:
(1) Radar : Uttam AESA radar (indigenous)
(2) Engine : Kaveri engine (indigenous)
(3) Ejection Seat : Martin-Baker (Russian)
(4) Beyond Visual Range Missile : BrahMos
(5) Question not attempted

99. By definition, the LCA Tejas is classified as the smallest and lightest in which category of contemporary aircraft?
(1) Subsonic trainer jets
(2) Strategic airlift cargo planes
(3) Supersonic combat aircraft
(4) High-altitude reconnaissance aircraft
(5) Question not attempted

100. What is the most appropriate historical objective of the LCA programme when it was initiated in the 1980s?
(1) To build a stealth fighter to counter the F-22 Raptor.
(2) To develop a dedicated carrier-based airborne early warning aircraft.
(3) To export fighters exclusively to African nations.
(4) To replace the aging fleet of MiG-21 fighters.
(5) Question not attempted

101. Consider the following statements regarding the Advanced Towed Artillery Gun System (ATAGS):
I. It is a 155 mm / 52 calibre howitzer.
II. It was jointly developed by DRDO with private sector partners Tata Power SED and Bharat Forge.
III. It holds the record for the longest firing range in its class.
IV. It is a self-propelled tracked artillery gun akin to a tank.
Which of the above statement(s) is/are correct?
(1) I, II, and III only
(2) II, III, and IV only
(3) I, III, and IV only
(4) I, II, and IV only
(5) Question not attempted

102. Match the artillery systems in List I with their key descriptors in List II:
List I: (System)
A. ATAGS
B. K9 Vajra
C. Dhanush
D. M777
List II: (Descriptor)
i. Ultra-light howitzer from the USA
ii. Self-propelled tracked howitzer
iii. Indigenous towed 155mm/52 calibre gun
iv. Upgraded indigenous version of the Bofors gun
(1) A-iii, B-ii, C-iv, D-i
(2) A-iv, B-i, C-iii, D-ii
(3) A-ii, B-iii, C-i, D-iv
(4) A-iii, B-iv, C-ii, D-i
(5) Question not attempted

103. The ATAGS features a gun barrel of what caliber and length?
(1) 105 mm / 37 calibre
(2) 130 mm / 45 calibre
(3) 155 mm / 52 calibre
(4) 120 mm / 44 calibre
(5) Question not attempted

104. Which statement correctly describes the developmental model of the ATAGS?
(1) DRDO design transferred to private industry for manufacturing.
(2) It was developed solely by foreign defense companies under a strict Make in India license.
(3) It was purchased off-the-shelf from Russia to meet immediate artillery requirements.
(4) It is an entirely government-manufactured weapon with no private sector involvement

NODIA

whatsoever.
(5) Question not attempted

105. Consider the following statements about ATAGS:
Statement I: It achieved a maximum firing range of approximately 48 km during trials.
Statement II: It uses an automated ammunition handling system to fire successive rounds rapidly.
Which of the above statement(s) is/are correct?
(1) Statement I is correct but Statement II is incorrect.
(2) Statement II is correct but Statement I is incorrect.
(3) Both statements are correct.
(4) Both statements are incorrect.
(5) Question not attempted

106. The conceptual integration of an all-electric drive in the ATAGS ensures:
(1) High reliability and reduced maintenance over hydraulic systems.
(2) The gun requires no explosive propellant to fire shells, using electromagnetic force instead.
(3) The gun can move silently across the battlefield like an electric car to avoid detection.
(4) It operates solely on solar power collected from panels mounted on the gun carriage.
(5) Question not attempted

107. Which of the following is a negative statement regarding the capabilities of ATAGS?
(1) It has an advanced communications and fire control system for precise targeting.
(2) It features a high burst rate of fire for overwhelming enemy positions.
(3) It has a larger chamber volume (25 litres) compared to other standard 155mm guns.
(4) It lacks an APU and must be towed for minor shifts.
(5) Question not attempted

108. The ATAGS project is a prime example of which Indian government defence initiative?
(1) Import Substitution exclusively by Ordnance Factories
(2) Aatmanirbhar Bharat (Self-reliant India)
(3) Foreign Military Sales (FMS) program
(4) Offset Policy execution by foreign OEMs
(5) Question not attempted

109. What is the tactical effect of equipping the ATAGS with an Advanced Fire Control System and an Auxiliary Power Unit?
(1) It allows the gun to fly short distances over terrain obstacles.
(2) It eliminates the need for an artillery crew entirely by automating all functions.
(3) It provides "shoot and scoot" capability for quick repositioning.
(4) It doubles the explosive yield of the artillery shells without changing their size.
(5) Question not attempted

110. Identify the odd one out among the following artillery guns in relation to indigenous development in India:
(1) Dhanush
(2) ATAGS
(3) Sharang
(4) Bofors FH-77
(5) Question not attempted

111. Consider the following statements regarding the Indian Space Research Organisation (ISRO):
I. It was formed on August 15, 1969.
II. It superseded the Indian National Committee for Space Research (INCOSPAR).
III. Dr. Vikram Sarabhai was its first chairman.
IV. It operates directly under the Prime Minister's Office via the Department of Space.
V. Its primary launch facility is located in Thiruvananthapuram.
Which of the above statement(s) is/are correct?
(1) I, II, III, and IV only
(2) I, II, IV, and V only
(3) II, III, IV, and V only
(4) I, III, IV, and V only
(5) Question not attempted

112. ISRO was established in 1969 to replace which of the following organizations?
(1) Defence Research and Development Organisation (DRDO)
(2) Indian National Committee for Space Research (INCOSPAR)
(3) Bhabha Atomic Research Centre (BARC)
(4) Tata Institute of Fundamental Research

Click Here to Buy book on Amazon

(TIFR)
(5) Question not attempted

113. Who is historically credited as the founding father of the Indian space programme?
(1) Dr. Homi J. Bhabha
(2) Dr. Vikram Sarabhai
(3) Dr. A.P.J. Abdul Kalam
(4) Prof. Satish Dhawan
(5) Question not attempted

114. Consider the following statements:
Statement I: The overarching vision of ISRO is to harness space technology for national development.
Statement II: ISRO primarily focuses on manned military space stations.
Which of the above statement(s) is/are correct?
(1) Statement I is correct but Statement II is incorrect.
(2) Statement II is correct but Statement I is incorrect.
(3) Both statements are correct.
(4) Both statements are incorrect.
(5) Question not attempted

115. In the organizational structure of India's space program, ISRO reports directly to which of the following departments?
(1) Department of Science and Technology (DST)
(2) Ministry of Defence
(3) Department of Space (DoS)
(4) Ministry of Earth Sciences
(5) Question not attempted

116. Identify the correctly matched pair of the ISRO centre and its primary function:
(1) Space Applications Centre (SAC) : Satellite integration and testing
(2) U R Rao Satellite Centre (URSC) : Liquid propulsion systems
(3) Satish Dhawan Space Centre (SDSC) : Spacecraft payloads
(4) Vikram Sarabhai Space Centre (VSSC) : Launch vehicle design and development
(5) Question not attempted

117. Which of the following is an incorrect statement regarding the commercial arms of ISRO?
(1) Antrix Corporation Limited is a commercial arm of ISRO.
(2) NewSpace India Limited (NSIL) acts as the commercial interface of the Department of Space.
(3) IN-SPACe is the sole manufacturer of ISRO's solid rockets.
(4) These entities aim to enable Indian industries to scale up a high-technology manufacturing base.
(5) Question not attempted

NODIA

118. By definition, what is the role of the Space Commission in India?
(1) To physically launch rockets from the various spaceports across the country.
(2) Policy formulation and oversight of the Indian space programme.
(3) To regulate international space law and ensure compliance with global space treaties.
(4) To manage the budget for the Ministry of Defence and related strategic research laboratories.
(5) Question not attempted

119. What was the effect of Dr. Vikram Sarabhai's initial vision on the trajectory of ISRO's early projects?
(1) A focus on competing directly with the US and USSR in the high-stakes Moon race.
(2) Prioritizing the development of long-range intercontinental ballistic missiles for national defense.
(3) A total reliance on foreign satellite technology without any indigenous development for decades.
(4) Emphasizing space applications for societal benefits like telecom.
(5) Question not attempted

120. The most appropriate function of ISRO's Master Control Facility (MCF) at Hassan and Bhopal is:
(1) Monitoring and controlling geostationary and geosynchronous satellites.
(2) Assembling launch vehicles for polar and geostationary orbits.
(3) Training astronauts for the upcoming Gaganyaan human spaceflight mission.
(4) Analyzing lunar soil samples returned by the Chandrayaan missions.
(5) Question not attempted

121. Consider the following statements regarding the Polar Satellite Launch Vehicle (PSLV):
I. It is a four-stage launch vehicle.
II. It uses alternating solid and liquid propulsion stages.
III. It is commonly referred to as the "Workhorse of ISRO".
Which of the above statement(s) is/are correct?
(1) I and II only
(2) II and III only
(3) I and III only
(4) I, II, and III
(5) Question not attempted

122. Match the ISRO launch vehicles in List I with their defining characteristics in List II:
List I: (Launch Vehicle)
A. SLV-3
B. PSLV
C. GSLV Mk II
D. LVM3 (GSLV Mk III)
List II: (Characteristic)
i. Features an indigenous cryogenic upper stage
ii. Heaviest launcher, designed for 4-ton class satellites to GTO
iii. India's first experimental satellite launch vehicle
iv. First operational launch vehicle with liquid stages
(1) A-iii, B-iv, C-i, D-ii
(2) A-i, B-ii, C-iii, D-iv
(3) A-iii, B-i, C-iv, D-ii
(4) A-iv, B-iii, C-ii, D-i
(5) Question not attempted

123. Arrange the following ISRO launch vehicles in ascending order of their payload carrying capacity to Low Earth Orbit (LEO):
I. LVM3
II. PSLV
III. SSLV (Small Satellite Launch Vehicle)
IV. GSLV Mk II
Which of the following is the correct sequence?
(1) III, II, IV, I
(2) III, IV, II, I
(3) II, III, I, IV
(4) III, II, I, IV
(5) Question not attempted

124. The propulsion sequence of the four stages of the PSLV from first (bottom) to fourth (top) is:
(1) Solid, Solid, Liquid, Liquid
(2) Liquid, Solid, Liquid, Solid
(3) Solid, Liquid, Solid, Liquid
(4) Liquid, Liquid, Solid, Solid
(5) Question not attempted

125. Which statement correctly highlights the major technological milestone achieved in the GSLV Mk II development?
(1) Successful use of a nuclear thermal rocket engine for deep space exploration missions.
(2) First time use of solid strap-on boosters to enhance the total liftoff thrust.
(3) Development and successful flight of an indigenous Cryogenic Upper Stage.
(4) Ability to return the first stage to the launch pad using a vertical landing mechanism.
(5) Question not attempted

126. Consider the following statements:
Statement I: The Vikas engine is a liquid-fueled rocket engine used in the second stage of PSLV and GSLV.
Statement II: The Vikas engine relies on liquid oxygen and liquid hydrogen as propellants.
Which of the above statement(s) is/are correct?
(1) Statement I is correct but Statement II is incorrect.
(2) Statement II is correct but Statement I is incorrect.
(3) Both statements are correct.
(4) Both statements are incorrect.
(5) Question not attempted

NODIA

127. The design architecture of the Launch Vehicle Mark-3 (LVM3) consists of:
(1) Two solid strap-on boosters, a core liquid stage, and a cryogenic upper stage.
(2) Four liquid strap-ons, a solid core, and a semi-cryogenic upper stage for heavy payloads.
(3) Three solid stages with no strap-ons to maintain a simplified and cost-effective design.
(4) A single-stage-to-orbit scramjet vehicle designed for rapid satellite deployment.
(5) Question not attempted

128. Which of the following is a negative statement regarding the operational history of the PSLV?
(1) It successfully launched the Chandrayaan-1 mission.
(2) It failed its very first developmental flight in 1993.
(3) It successfully launched the Mars Orbiter Mission.
(4) It has never been used to launch a payload into a Geosynchronous Transfer Orbit (GTO).
(5) Question not attempted

129. The PSLV has earned its reputation primarily by placing earth observation and remote sensing satellites into which specific orbit?
(1) Low Earth Equatorial Orbit
(2) Sun-Synchronous Polar Orbit
(3) Geostationary Orbit
(4) Lagrange Point 1 Halo Orbit
(5) Question not attempted

130. Identify the odd one out among the rocket engines/motors used by ISRO:
(1) Merlin
(2) Vikas
(3) CE-20
(4) S200
(5) Question not attempted

131. Consider the following statements regarding the Chandrayaan-1 mission:
I. It was launched in 2008 using the PSLV-C11.
II. It included a Moon Impact Probe (MIP) that crash-landed near the lunar south pole.
III. It definitively discovered evidence of water molecules on the lunar surface.
Which of the above statement(s) is/are correct?
(1) I and II only
(2) II and III only
(3) I and III only
(4) I, II, and III
(5) Question not attempted

132. The following question consists of two statements, Assertion (A) and Reason (R). Answer the question by selecting the appropriate option.
Assertion (A): The Chandrayaan-2 mission is often described as partially successful.
Reason (R): While the Vikram lander crashed during the final descent, the Orbiter was successfully placed in lunar orbit and continues to send valuable scientific data.
(1) Both A and R are true and R is the correct explanation of A.
(2) Both A and R are true but R is not the correct explanation of A.
(3) A is true but R is false.
(4) A is false but R is true.
(5) Question not attempted

133. The critical instrument on Chandrayaan-1 that helped discover water on the Moon, the Moon Mineralogy Mapper (M3), was contributed by:
(1) European Space Agency (ESA)
(2) Roscosmos (Russia)
(3) NASA (USA)
(4) JAXA (Japan)
(5) Question not attempted

134. Which launch vehicle was used to launch the Chandrayaan-2 mission in 2019?
(1) PSLV-XL
(2) GSLV Mk III (LVM3)
(3) GSLV Mk II
(4) SSLV
(5) Question not attempted

135. Consider the following statements:
Statement I: The primary reason for the failure of the Chandrayaan-2 lander was a software glitch that caused loss of control during the fine braking phase.
Statement II: Chandrayaan-3 utilized the exact same lander design and software algorithms as Chandrayaan-2 without modifications.
Which of the above statement(s) is/are correct?
(1) Statement I is correct but Statement II is incorrect.
(2) Statement II is correct but Statement I is incorrect.
(3) Both statements are correct.
(4) Both statements are incorrect.
(5) Question not attempted

136. A key conceptual design change in the Chandrayaan-3 lander compared to Chandrayaan-2 was:
(1) Central engine removal and strengthening of landing legs.
(2) The addition of a fifth central engine to

Downloaded from www.pdf.tube

provide more stability during the final hover phase.
(3) Making the lander capable of returning to Earth after collecting soil samples for study.
(4) Removing the rover entirely to save weight and focus solely on stationary lander experiments.
(5) Question not attempted

137. Which of the following components was NOT a part of the Chandrayaan-3 mission configuration?
(1) A propulsion module
(2) A lunar lander
(3) Dedicated lunar orbiter payload module.
(4) A lunar rover
(5) Question not attempted

138. Identify the correctly matched pair of the Chandrayaan mission elements:
(1) Lunar Lander : Vikram
(2) Lunar Orbiter : Pragyan
(3) Lunar Rover : Vyommitra
(4) Moon Impact Probe : Shakti
(5) Question not attempted

139. By definition, a Lunar Orbit Insertion (LOI) maneuver during the Chandrayaan missions refers to:
(1) The rocket lifting off from Earth's surface at the start of the mission.
(2) The rover rolling down the ramp onto the lunar surface for the first time.
(3) The spacecraft crashing into the lunar surface as a planned impact experiment.
(4) Engine firing to allow capture by the Moon's gravity.
(5) Question not attempted

140. What is the most appropriate overarching objective of ISRO's Chandrayaan series?
(1) To establish a permanent military base on the Moon for strategic surveillance.
(2) To demonstrate tech capabilities for planetary exploration and lunar study.
(3) To mine Helium-3 and transport it back to Earth for immediate commercial sale.
(4) To test anti-satellite weapons against lunar targets as part of a defense exercise.
(5) Question not attempted

141. Consider the following scientific payloads carried by the Chandrayaan-3 Vikram lander:
I. RAMBHA-LP
II. ChaSTE
III. ILSA
IV. SHAPE
Which of the above statement(s) is/are payloads situated on the lander itself?
(1) I, II, and III only
(2) II, IV, and V only
(3) I, III, and IV only
(4) I, II, III, IV, and V
(5) Question not attempted

142. Match the Chandrayaan-3 payloads in List I with their functions in List II:
List I: (Payload)
A. ChaSTE
B. ILSA
C. APXS (on Rover)
D. RAMBHA
List II: (Function)
i. Measures lunar seismic activity
ii. Derives elemental composition of lunar soil
iii. Measures near-surface plasma density
iv. Measures thermal properties of the lunar surface
(1) A-iv, B-i, C-ii, D-iii
(2) A-i, B-ii, C-iii, D-iv
(3) A-iv, B-ii, C-i, D-iii
(4) A-iii, B-i, C-ii, D-iv
(5) Question not attempted

143. On which date did the Chandrayaan-3 lander successfully touch down near the lunar south pole?
(1) July 14, 2023
(2) August 23, 2023
(3) September 5, 2023
(4) October 2, 2023
(5) Question not attempted

NODIA

144. The Indian government officially named the landing site of Chandrayaan-3 as:
(1) Tiranga Point
(2) Shiv Shakti Point
(3) Jawahar Point
(4) Kalam Point
(5) Question not attempted

145. Consider the following statements:

Statement I: The lunar south pole is a region of high scientific interest because of permanently shadowed craters that may contain water ice.
Statement II: India is the fourth country to land on the Moon, but the first to land near the lunar south pole.
Which of the above statement(s) is/are correct?
(1) Statement I is correct but Statement II is incorrect.
(2) Statement II is correct but Statement I is incorrect.
(3) Both statements are correct.
(4) Both statements are incorrect.
(5) Question not attempted

146. Conceptually, what was the significance of the "hop experiment" performed by the Vikram lander before it went to sleep?
(1) Engine firing for tech validation of future return missions.
(2) It proved the lander could drill deep into the lunar mantle to collect core samples.
(3) It ejected the rover back into orbit for data relay to Earth stations.
(4) It deployed a specialized parachute to test atmospheric landing on the Moon.
(5) Question not attempted

147. Which of the following countries did NOT achieve a soft landing on the Moon before India?
(1) Soviet Union
(2) United States
(3) Japan
(4) China
(5) Question not attempted

148. To commemorate the success of Chandrayaan-3, August 23 has been declared in India as:
(1) National Lunar Day
(2) ISRO Foundation Day
(3) Kalam Memorial Day
(4) National Space Day
(5) Question not attempted

149. The cause of the Vikram lander and Pragyan rover permanently losing communication after 14 Earth days was:
(1) A meteor strike on the landing site that destroyed the communication array.
(2) The rover driving off a steep cliff and losing its line-of-sight signal to the lander.
(3) Lunar night onset, freezing temperatures, and no solar power.
(4) A deliberate self-destruct command from ISRO to conclude the mission as planned.
(5) Question not attempted

150. Identify the odd one out among the following Indian space missions:
(1) Chandrayaan-1
(2) Shukrayaan-1
(3) Chandrayaan-2
(4) Chandrayaan-3
(5) Question not attempted

151. Consider the following statements regarding the Mars Orbiter Mission (Mangalyaan):
I. It was launched in 2013 using the PSLV-C25.
II. It made India the first Asian nation to reach Martian orbit.
III. It made ISRO the first space agency to succeed in a Mars mission on its maiden attempt.
IV. The total cost of the mission was approximately Rs 450 crore.
V. It included a lander named 'Mars-Vikram'.
Which of the above statement(s) is/are correct?
(1) I, II, III, and IV only
(2) I, III, IV, and V only
(3) II, III, IV, and V only
(4) I, II, IV, and V only
(5) Question not attempted

152. Mangalyaan (MOM) was launched from Sriharikota on:
(1) November 5, 2013
(2) September 24, 2014
(3) October 22, 2008
(4) July 22, 2019
(5) Question not attempted

153. A globally recognized hallmark of the Mars Orbiter Mission was its cost-effectiveness. The mission's approximate cost of $74 million was famously compared to:
(1) The budget of the original Apollo 11 moon landing mission.
(2) The total cost of building the Burj Khalifa in Dubai.
(3) The budget of the Hollywood movie 'Gravity'.
(4) The annual national defence budget of the

Click Here to Buy book on Amazon

Republic of India.
(5) Question not attempted

154. Consider the following statements:
Statement I: India became the fourth space agency globally to reach Mars, after Roscosmos, NASA, and the European Space Agency.
Statement II: The Mars Orbiter Mission was designed for an operational life of 10 years but lasted only 6 months.
Which of the above statement(s) is/are correct?
(1) Statement I is correct but Statement II is incorrect.
(2) Statement II is correct but Statement I is incorrect.
(3) Both statements are correct.
(4) Both statements are incorrect.
(5) Question not attempted

155. Conceptually, what orbital maneuver did Mangalyaan use to travel from Earth to Mars while consuming minimal fuel?
(1) Direct ascent trajectory
(2) Warp drive transition
(3) Gravitational slingshot around Venus
(4) Hohmann transfer orbit
(5) Question not attempted

156. Which of the following correctly pairs a payload on Mangalyaan with its primary objective?
(1) Methane Sensor for Mars (MSM) : To map the surface topography
(2) MCC : Optical imaging of Martian surface and moons.
(3) Thermal Infrared Imaging Spectrometer (TIS) : To measure the solar wind
(4) Lyman Alpha Photometer (LAP) : To detect liquid water on the surface
(5) Question not attempted

157. Which of the following is an incorrect statement regarding the objectives of the Mars Orbiter Mission?
(1) To explore Martian surface features and mineralogy.
(2) To study the Martian atmosphere.
(3) To physically return Martian soil samples to Earth.
(4) To demonstrate the technological capability to reach Martian orbit.
(5) Question not attempted

158. The Lyman Alpha Photometer on Mangalyaan was primarily tasked with studying the Martian exosphere to measure the relative abundance of:
(1) Oxygen and Nitrogen
(2) Methane and Carbon Dioxide
(3) Helium and Argon
(4) Deuterium and Hydrogen
(5) Question not attempted

159. The cause for using the PSLV instead of the heavier GSLV for the Mars Orbiter Mission was:
(1) PSLV cost and GSLV reliability issues at that time.
(2) GSLV was banned by the UN for use in interplanetary missions.
(3) PSLV can carry heavier payloads than GSLV for long distances.
(4) PSLV was explicitly designed only for interplanetary missions and nothing else.
(5) Question not attempted

NODIA

160. What is the most appropriate technological legacy of Mangalyaan for ISRO?
(1) It proved that humans can survive the radiation in deep space.
(2) Deep space communication and navigation capability for India.
(3) It eliminated the need for Earth observation satellites entirely.
(4) It successfully tested anti-asteroid kinetic impactors for planetary defense.
(5) Question not attempted

161. Consider the following statements regarding the Gaganyaan programme:
I. It aims to demonstrate human spaceflight capability by launching a crew into a 400 km orbit.
II. The planned mission duration is for 3 days.
III. It will return the crew safely to Earth by landing them directly on the Thar Desert.
Which of the above statement(s) is/are correct?
(1) I and II only
(2) II and III only
(3) I and III only
(4) I, II, and III
(5) Question not attempted

162. Match the components of the Gaganyaan mission in List I with their functions in List II:
List I: (Component)

A. Orbital Module
B. Crew Module
C. Service Module
D. Crew Escape System

List II: (Function)

i. Provides power, propulsion, and avionics while in orbit
ii. Pulls the crew away to safety in case of a launch pad anomaly
iii. The combined structure housing the astronauts and supporting systems in space
iv. The habitable capsule where astronauts live during the mission

(1) A-iii, B-iv, C-i, D-ii
(2) A-i, B-ii, C-iii, D-iv
(3) A-iv, B-iii, C-ii, D-i
(4) A-ii, B-iv, C-i, D-iii
(5) Question not attempted

163. Arrange the following events of a nominal Gaganyaan crewed flight in chronological order:

I. Splashdown in Indian sea waters
II. Launch via HLVM3
III. De-boost maneuver and Re-entry
IV. Orbiting the Earth at 400 km

Which of the following is the correct order?

(1) II, IV, III, I
(2) II, III, IV, I
(3) IV, II, III, I
(4) II, IV, I, III
(5) Question not attempted

164. The human-rated launch vehicle chosen for the Gaganyaan mission is:

(1) HPSLV
(2) HSSLV
(3) NGLV
(4) HLVM3
(5) Question not attempted

165. Which statement correctly describes "Vyommitra" in the context of the Gaganyaan mission?

(1) It is the name of the lunar module for the next moon mission.
(2) It is the tracking ship stationed in the Pacific Ocean for relay.
(3) A half-humanoid robot to simulate functions in test flights.
(4) It is the indigenous spacesuit designed for the Indian astronauts.
(5) Question not attempted

166. Consider the following statements:

Statement I: The four astronaut-designates for the Gaganyaan mission were selected from the Indian Air Force test pilot pool.

Statement II: They received their initial generic spaceflight training at the Yuri Gagarin Cosmonaut Training Center in Russia.

Which of the above statement(s) is/are correct?

(1) Statement I is correct but Statement II is incorrect.
(2) Statement II is correct but Statement I is incorrect.
(3) Both statements are correct.
(4) Both statements are incorrect.
(5) Question not attempted

167. The conceptual necessity of the Test Vehicle Abort Mission-1 (TV-D1) conducted by ISRO was primarily to validate:

(1) The cryogenic engine's thrust in a vacuum environment.
(2) The deployment of solar panels in low earth orbit.
(3) The communication link with the Mars Orbiter during blackout.
(4) Crew Escape System performance under high dynamic pressure.
(5) Question not attempted

168. Which of the following statements about the Gaganyaan mission is incorrect?

(1) The ECLSS is entirely imported from NASA's surplus inventory.
(2) It aims to carry a crew of up to three members.
(3) The capsule is designed to splash down in the Bay of Bengal or Arabian Sea.
(4) It requires upgrading the LVM3 to human-rated standards.
(5) Question not attempted

169. What is the name of the recovery agency that is jointly working with ISRO for the post-splashdown recovery of the Gaganyaan crew module?

(1) Indian Army
(2) National Disaster Response Force (NDRF)
(3) Indian Navy
(4) Indian Coast Guard

Downloaded from www.pdf.tube

(5) Question not attempted

170. Which of the following individuals is the odd one out as they were NOT announced as an astronaut-designate for the Gaganyaan mission?
(1) Rakesh Sharma
(2) Prasanth Balakrishnan Nair
(3) Ajit Krishnan
(4) Shubhanshu Shukla
(5) Question not attempted

171. Consider the following statements regarding the INSAT system:
I. It stands for Indian National Satellite System.
II. It is one of the largest domestic communication satellite systems in the Asia-Pacific region.
III. It only provides services for military communications.
Which of the above statement(s) is/are correct?
(1) I and II only
(2) II and III only
(3) I and III only
(4) I, II, and III
(5) Question not attempted

172. The following question consists of two statements, Assertion (A) and Reason (R). Answer the question by selecting the appropriate option.
Assertion (A): ISRO shifted its naming convention for communication satellites from the INSAT series to the GSAT series.
Reason (R): The GSAT (Geosynchronous Satellite) series represents a newer generation of indigenous satellites specifically dedicated to expanding telecommunication and broadcasting capabilities.
(1) Both A and R are true and R is the correct explanation of A.
(2) Both A and R are true but R is not the correct explanation of A.
(3) A is true but R is false.
(4) A is false but R is true.
(5) Question not attempted

173. The INSAT series of satellites are typically placed in which type of orbit?
(1) Low Earth Orbit
(2) Sun-Synchronous Polar Orbit
(3) Geostationary Orbit
(4) Medium Earth Orbit
(5) Question not attempted

174. Which major socio-economic sector did the INSAT system revolutionize in India during the 1980s and 90s?
(1) Deep sea mining
(2) High-speed rail transport
(3) Cryptocurrency mining
(4) TV broadcasting and telecommunications.
(5) Question not attempted

175. Consider the following statements:
Statement I: GSAT-3, also known as EDUSAT, was India's first exclusive satellite dedicated to the educational sector.
Statement II: EDUSAT was a low earth orbit satellite meant to map university campuses.
Which of the above statement(s) is/are correct?
(1) Statement I is correct but Statement II is incorrect.
(2) Statement II is correct but Statement I is incorrect.
(3) Both statements are correct.
(4) Both statements are incorrect.
(5) Question not attempted

176. Conceptually, communication satellites like those in the GSAT series act as a relay station in space using:
(1) Optical telescopes for high-resolution visual tracking of radio waves.
(2) Transponders in C, Ku, and Ka bands.
(3) Synthetic Aperture Radars for mapping ground signal stations in detail.
(4) Seismometers to detect disturbances in the satellite's orbital position.
(5) Question not attempted

177. Which of the following services is generally NOT provided by the standard INSAT/GSAT communication satellites?
(1) Direct-to-Home (DTH) television broadcast for domestic consumers.
(2) High-resolution optical spy imagery.
(3) VSAT networking for secure banking and international finance operations.
(4) Satellite Aided Search and Rescue (SAS&R) for distressed vessels.
(5) Question not attempted

NODIA

178. Identify the correctly matched pair regarding specialized GSAT satellites:
(1) GSAT-7 (Rukmini) : Dedicated communication for the Indian Navy
(2) GSAT-7A (Angry Bird) : Dedicated for agricultural monitoring
(3) GSAT-9 (South Asia Satellite) : Dedicated for the Indian Army only
(4) GSAT-11 : Dedicated meteorological satellite
(5) Question not attempted

179. By definition, a High Throughput Satellite (HTS) in the GSAT fleet provides significantly more data capacity than traditional satellites by using:
(1) A single, massive, wide-coverage beam over the entire country.
(2) A larger solar panel array to boost internet speeds significantly.
(3) Multiple spot beams for frequency reuse.
(4) Copper wire connections to ground stations for faster transmission.
(5) Question not attempted

180. The most appropriate benefit of deploying GSAT networks for India's rural health sector is:
(1) Real-time delivery of medical supplies via satellite drop in remote areas.
(2) Providing direct radiation therapy from space using targeted energy beams.
(3) Controlling local weather patterns to prevent seasonal infectious diseases.
(4) Enabling Tele-medicine and expert consultation via VSAT.
(5) Question not attempted

181. Consider the following statements regarding NavIC:
I. It is India's independent regional navigation satellite system.
II. Its operational name is Navigation with Indian Constellation.
III. The constellation currently consists of 24 satellites.
IV. It provides coverage over the Indian landmass and extending up to 1500 km around it.
Which of the above statement(s) is/are correct?
(1) I, II, and III only
(2) I, II, and IV only
(3) II, III, and IV only
(4) I, III, and IV only
(5) Question not attempted

182. Match the global/regional navigation systems in List I with their respective countries/regions in List II:
List I: (Navigation System)
A. GPS
B. GLONASS
C. Galileo
D. NavIC
List II: (Country/Region)
i. European Union
ii. India
iii. Russia
iv. United States
(1) A-iv, B-iii, C-i, D-ii
(2) A-i, B-ii, C-iii, D-iv
(3) A-iv, B-i, C-iii, D-ii
(4) A-iii, B-iv, C-ii, D-i
(5) Question not attempted

183. NavIC provides two types of services. These are:
(1) Standard Positioning Service (SPS) and Restricted Service (RS)
(2) Commercial Service and Emergency Service
(3) Civil Service and Air Force Service
(4) Standard Positioning Service and Premium Subscription Service
(5) Question not attempted

184. The space segment of the IRNSS (NavIC) originally consists of a constellation of how many satellites?
(1) 4
(2) 7
(3) 12
(4) 30
(5) Question not attempted

185. Consider the following statements:
Statement I: The NavIC constellation utilizes satellites placed in both Geostationary and Geosynchronous orbits.
Statement II: NavIC relies on atomic clocks imported from Russia.
Which of the above statement(s) is/are correct?
(1) Statement I is correct but Statement II is incorrect.
(2) Statement II is correct but Statement I is incorrect.

Click Here to Buy book on Amazon

(3) Both statements are correct.
(4) Both statements are incorrect.
(5) Question not attempted

186. Conceptually, NavIC satellites broadcast signals in which frequency bands to provide position data?
(1) L5 and S bands
(2) Ku and Ka bands
(3) X and V bands
(4) VHF and UHF bands
(5) Question not attempted

187. Which of the following is a negative event that affected the IRNSS constellation?
(1) IRNSS-1A suffered a failure of all its three onboard Rubidium atomic clocks.
(2) The PSLV-C39 failed to deploy the replacement satellite IRNSS-1H because the heat shield did not separate.
(3) IRNSS satellites crashed into each other in orbit.
(4) Both (1) and (2) are true negative events.
(5) Question not attempted

188. Identify the correctly matched pair regarding the NavIC system components:
(1) Ground Segment : User smartphones
(2) Space Segment : The 7 satellite constellation
(3) User Segment : ISRO Master Control Facility
(4) Restricted Service : Open to all civilians
(5) Question not attempted

189. What historical military event acts as the primary cause for India deciding to build its own indigenous navigation system (NavIC)?
(1) The 1962 Sino-Indian War
(2) The 1971 Indo-Pak War
(3) 1999 Kargil War GPS data denial.
(4) The 2016 Uri attacks
(5) Question not attempted

190. Which of the following is the odd one out as it is NOT a satellite navigation system?
(1) BeiDou
(2) QZSS
(3) GLONASS
(4) Mangalyaan
(5) Question not attempted

191. Consider the following payloads onboard the Aditya-L1 spacecraft:
I. Visible Emission Line Coronagraph (VELC)
II. Solar Ultraviolet Imaging Telescope (SUIT)
III. Aditya Solar wind Particle Experiment (ASPEX)
IV. Plasma Analyser Package for Aditya (PAPA)
V. Solar Low Energy X-ray Spectrometer (SoLEXS)
Which of the above statement(s) is/are payloads designed to study the Sun and solar wind?
(1) I, II, and III only
(2) II, IV, and V only
(3) I, III, IV, and V only
(4) I, II, III, IV, and V
(5) Question not attempted

192. Aditya-L1, India's first solar observatory mission, is placed in a halo orbit around which Lagrange point of the Sun-Earth system?
(1) L1
(2) L2
(3) L3
(4) L4
(5) Question not attempted

193. Aditya-L1 spacecraft was successfully launched by which ISRO launch vehicle?
(1) GSLV Mk II
(2) PSLV-C57
(3) LVM3
(4) SSLV-D2
(5) Question not attempted

194. Consider the following statements:
Statement I: Placing Aditya-L1 in a halo orbit around the L1 point allows it to view the Sun continuously without any eclipses or occultations.
Statement II: The L1 point is located at a distance of about 1.5 million kilometers from the Earth.
Which of the above statement(s) is/are correct?
(1) Statement I is correct but Statement II is incorrect.
(2) Statement II is correct but Statement I is incorrect.
(3) Both statements are correct.
(4) Both statements are incorrect.
(5) Question not attempted

Downloaded from www.pdf.tube

195. Conceptually, the "coronal heating problem" that Aditya-L1 intends to study refers to the mystery of why:
(1) The Sun's core is hotter than its surface due to sustained nuclear fusion in the center.
(2) The solar wind cools down as it approaches Earth and interacts with the magnetic field.
(3) The corona is vastly hotter than the photosphere.
(4) Sunspots are cooler than surrounding areas because of intense local magnetic activity.
(5) Question not attempted

196. Identify the correctly matched pair of the Aditya-L1 payload and its specific target of study:
(1) SUIT : Measuring the Sun's magnetic field directly at the core for deep solar analysis.
(2) PAPA : Imaging the dark side of the Moon to understand its geological history better.
(3) ASPEX : Analyzing Martian dust storms and their impact on future landing missions.
(4) VELC : Studying the solar corona and CMEs.
(5) Question not attempted

197. Which of the following layers of the Sun is inherently impossible to be directly studied via remote sensing instruments on Aditya-L1?
(1) Photosphere
(2) Chromosphere
(3) Corona
(4) Solar Core
(5) Question not attempted

198. By definition, a Lagrange point in space is a position where:
(1) The gravitational pull of the Milky Way galaxy is exactly zero for all nearby objects.
(2) Two-body gravity balances centrifugal force.
(3) Solar radiation is completely blocked by planetary bodies to create a permanent shadow zone.
(4) Spacecraft can travel faster than the speed of light by utilizing local gravitational warping.
(5) Question not attempted

199. What is a key practical effect of Coronal Mass Ejections (CMEs) and solar flares that Aditya-L1 seeks to monitor for Earth's benefit?
(1) They cause intense lunar quakes that can be felt by future moon-based observatories.
(2) They increase global warming by instantly raising Earth's atmospheric temperature significantly.
(3) They cause solar eclipses to occur more frequently than predicted by orbital mechanics.
(4) Solar weather disrupting satellites and grids.
(5) Question not attempted

200. What is the most appropriate overall significance of the Aditya-L1 mission for India's space programme?
(1) Operational deep space solar observatories.
(2) It marks India's entry into human spaceflight with a focus on long-term orbital stays.
(3) It guarantees a continuous and unlimited supply of solar energy to Indian cities via microwaves.
(4) It is the final mission planned by ISRO before a complete transition to private entities.
(5) Question not attempted

NODIA

www.nodia.in

ANSWERS

1. (3) 1958
The Defence Research and Development Organisation was formed in 1958 through the merger of several existing technical entities. This amalgamation integrated the Technical Development Establishment and the Directorate of Technical Development and Production with the Defence Science Organisation. Its primary purpose is to enhance self-reliance in Indian military technology through indigenous scientific research and development.

2. (1) A-ii, B-iii, C-iv, D-i
Defence metallurgical research and advanced numerical analysis are conducted in Hyderabad. Meanwhile, the development of combat vehicles is primarily centered in Chennai at the specialized establishment dedicated to armored platforms. Research involving various defense laboratory functions takes place in Jodhpur. These strategic locations allow for focused scientific advancements across diverse geographical hubs supporting Indian military requirements and technological innovation.

3. (2) I, III, II, IV
The strategic timeline of Indian scientific achievements began with the establishment of the defense research organization in 1958. This was followed by the formal creation of the national space agency in 1969. Subsequently, the first peaceful nuclear explosion occurred in 1974. Finally, the integrated guided missile development program was officially launched in 1983 to achieve self-sufficiency in missile technology.

4. (4) Balasya Mulam Vigyanam
The official motto of this premier defense research agency translates to the concept that the source of strength lies in science. This philosophy underscores the commitment to leveraging advanced scientific research and technological innovation to bolster national security. It reflects the organization's core mission of empowering the Indian armed forces with cutting-edge indigenous systems through rigorous and dedicated scientific exploration.

5. (3) Nodal agency for designing commercial passenger aircraft
While this organization plays a vital role in national security by advising the government on military logistics and equipment, its primary focus is on defense technology. It collaborates with academia and private industry to develop strategic systems for the armed forces. Designing commercial passenger aircraft is outside its mandate, as such tasks fall under civil aviation and aeronautics development entities.

6. (2) To support MSMEs and startups in achieving self-reliance in defence technology
This specific financial mechanism is designed to foster a culture of innovation by providing crucial support to micro, small, and medium enterprises. By encouraging startups to engage in the design and development of military systems, it aims to reduce dependence on foreign imports. This initiative aligns with the national objective of building a robust and self-reliant indigenous defense industrial ecosystem.

7. (4) Yes, it is an indigenous AEW&C system developed by DRDO
This airborne early warning and control system represents a significant milestone in indigenous defense technology. Mounted on an aircraft, it provides crucial surveillance, tracking, and command capabilities to the air force. By detecting incoming threats and managing aerial battles, it acts as a force multiplier. This platform enhances national security through its ability to monitor vast airspaces and coordinate tactical responses.

8. (1) A prototype used to validate complex new technologies before formal weapon system integration
This classification refers to a specialized experimental platform designed to test and prove the feasibility of advanced scientific concepts. Before a weapon system undergoes mass

Click Here to Buy book on Amazon

production or induction into the military, these vehicles allow researchers to identify potential flaws and optimize performance. They serve as essential steps in the development cycle, ensuring that final military hardware meets rigorous operational and technical standards.

9. (3) Are military-developed technologies adapted for civilian and societal benefits
Scientific advancements originally created for defense applications can often be repurposed for broader public use. These adaptations provide innovative solutions in sectors such as healthcare, disaster management, and telecommunications. By leveraging high-end military research, society gains access to sophisticated tools and materials. This process maximizes the return on national research investments and contributes to the overall technological progress of the country.

10. (1) Tactical command of the Armed Forces during wartime
This department is responsible for formulating research programs and providing technical guidance to the defense leadership. It manages numerous laboratories focused on modernizing military equipment through scientific advancement. However, the actual operational and tactical control of soldiers and units during active conflict remains the duty of the military services themselves. Scientific organizations support the defense infrastructure without exercising direct combat command.

11. (1) I and II only
The integrated guided missile development program was initiated in 1983 under the visionary leadership of a prominent scientist. It focused on creating a family of indigenous missiles to ensure national security through self-reliance. After achieving its set objectives, the program was formally concluded in 2008. While it laid the foundation for missile technology, the BrahMos project was a separate joint venture effort.

12. (1) Both A and R are true and R is the correct explanation of A
The Indian government launched a comprehensive missile program primarily to overcome severe international restrictions on sensitive technology. During the Cold War era, regimes like the missile technology control initiative sought to prevent the proliferation of advanced delivery systems. Consequently, India prioritized indigenous research and development to build its own strategic arsenal, thereby ensuring national security and bypassing global technological denial frameworks.

13. (3) PATNA (Prithvi, Agni, Trishul, Nag, Akash)
This acronym represents the five foundational missile systems developed to provide a comprehensive defense capability. It includes short-range and intermediate-range ballistic missiles for strategic deterrence. Additionally, it encompasses surface-to-air systems for aerial defense and a dedicated anti-tank guided weapon. These projects were grouped together to streamline indigenous research efforts and achieve technological self-sufficiency across different military requirements and operational combat environments.

14. (4) It achieved simultaneous development of strategic and tactical missiles
The program was unique in its approach to developing multiple classes of missile systems concurrently. It addressed the need for both battlefield tactical weapons and long-range strategic deterrents under a unified management structure. This simultaneous development allowed for the sharing of subsystems and technological breakthroughs across different projects. It successfully established a robust indigenous industrial base for advanced missile manufacturing and engineering.

15. (2) Trishul is an intercontinental ballistic missile
This particular system was designed as a short-range, quick-reaction surface-to-air missile for point defense. In contrast, other projects within the same program included anti-tank weapons and long-range surface-to-surface ballistic platforms. The classification of this missile as a long-range strategic weapon is incorrect, as its primary purpose was to intercept low-flying aerial targets at relatively close distances during combat operations.

16. (2) Missile Technology Control Regime (MTCR)
This international informal association aims to limit the proliferation of missiles and unmanned delivery systems capable of carrying weapons of mass destruction. By restricting the export of

NODIA

critical components and software, it presented a significant challenge to emerging nations. India responded by intensifying its indigenous research programs to develop these advanced capabilities independently, ensuring that national security remained uncompromised by global restrictions.

17. (2) Dr. A.P.J. Abdul Kalam
This renowned scientist and former president played a fundamental role in the success of the integrated guided missile development program. His leadership transformed the landscape of indigenous defense technology, leading to the creation of strategic assets like the Agni and Prithvi series. His dedication to science and national service earned him a distinct title associated with his immense contributions to rocketry.

18. (1) Statement I is correct but Statement II is incorrect
The primary objective of the missile development initiative was to foster indigenous capabilities and reduce dependence on foreign hardware. It aimed to provide the armed forces with a reliable and modern missile inventory. Although it faced technical hurdles, the program continued well beyond 1990, eventually meeting its core goals. It was officially declared complete in 2008, rather than being shut down prematurely.

19. (3) It established a credible indigenous deterrence capability against regional adversaries
The successful development of varied missile systems significantly strengthened the national defense posture. By creating a reliable family of weapons ranging from short-range tactical missiles to long-range strategic delivery vehicles, the program ensured that the country could protect its borders effectively. This indigenous capability provides a robust deterrent against external threats, reducing the vulnerability associated with relying on imported defense technology.

20. (4) Nirbhay
While the other mentioned systems were the five core projects initiated under the integrated guided missile development program, this particular weapon is a long-range sub-sonic cruise missile developed later. It utilizes a different flight profile and technology base compared to the original ballistic and tactical systems. It represents a separate advancement in indigenous capability beyond the scope of the foundational 1983 program.

21. (1) I and II only
The Agni series includes various classes of ballistic missiles with differing ranges. The initial version is designed for short-range strikes, while the fifth variant is categorized as a long-range intercontinental system. Modern versions have transitioned to using solid propellants for improved readiness and storage. Statements suggesting that the second variant exceeds five thousand kilometers or that the series relies mostly on liquid fuels are incorrect.

22. (1) A-ii, B-i, C-iv, D-iii
The first version of this missile covers distances up to nine hundred kilometers, while the third variant reaches over three thousand kilometers. The fourth iteration extends the reach to four thousand kilometers. The most advanced version, the fifth, is capable of striking targets at distances exceeding five thousand kilometers. This progression demonstrates the growing technical expertise in developing long-range strategic deterrents for defense.

23. (4) Intercontinental Ballistic Missile (ICBM)
With an operational range exceeding five thousand kilometers, this advanced missile system is classified as a long-range strategic weapon. It provides a significant deterrent by being capable of reaching targets across entire continents. This capability places the nation among a select group of countries possessing such sophisticated technology. It represents the pinnacle of indigenous ballistic development, ensuring a credible and robust national security posture.

24. (3) Both statements are correct
The early development phases of this missile series incorporated a mix of solid and liquid propulsion technologies to achieve the required performance. As the program evolved, there was a strategic shift toward purely solid-fueled engines for better operational utility. The fifth variant utilizes a three-stage solid-fuel configuration, which allows for faster launch

Downloaded from www.pdf.tube

times and enhanced mobility compared to systems requiring complex liquid fueling.

25. (3) Agni-P : Canisterised, highly maneuverable next-generation ballistic missile
This modern variant is a two-stage solid-propellant missile that incorporates advanced navigation and guidance systems. Its canisterised design significantly improves its mobility and readiness for rapid deployment. Unlike older liquid-fueled systems, it can be easily transported and launched from mobile platforms. This next-generation weapon enhances the flexibility and survivability of the strategic arsenal, providing a more responsive deterrent against potential regional threats.

26. (1) The Agni series was developed exclusively by foreign defense contractors
This series of strategic missiles is the result of intensive indigenous research and development led by national laboratories. While some specific components may involve international cooperation, the design and integration are entirely domestic accomplishments. These systems are capable of carrying varied warheads and provide a vital second-strike capability. They also utilize advanced avionics to ensure high accuracy and reliability during their complex flight paths.

27. (3) 1,500 kg
This long-range ballistic missile is designed to carry a substantial warhead to distant targets. Its payload capacity of approximately fifteen hundred kilograms allows for the integration of various types of strategic warheads, including nuclear configurations. This weight capacity ensures that the missile can deliver a powerful strike across intercontinental distances, maintaining a credible deterrent while utilizing its advanced three-stage solid propulsion and guidance systems.

28. (2) A single missile can carry multiple nuclear warheads directed at different targets
This advanced technology allows a single ballistic missile to deploy several independent re-entry vehicles during its flight. Each vehicle can be programmed to hit a separate geographic location, significantly complicating the task for enemy missile defense systems. By increasing the number of targets engaged per launch, it enhances the effectiveness and saturation capability of the strategic deterrent, ensuring higher survivability of the strike.

29. (3) They follow a sub-orbital parabolic flightpath, exiting and re-entering the atmosphere
These missiles are characterized by a flight profile where they are powered only during the initial phase of their journey. After engine burnout, the vehicle follows a high-altitude trajectory governed by gravity and aerodynamics. Unlike cruise missiles that stay within the atmosphere and use sustained propulsion, these platforms often reach space before descending towards their targets. This parabolic path is the defining feature of ballistic delivery.

30. (4) It improves launch readiness and allows deployment from mobile platforms
Housing a missile in a sealed container protects it from environmental degradation during long-term storage and transport. This system enables the weapon to be launched directly from the canister, which reduces the time required for preparation. It also makes the missile easier to move via road or rail, enhancing its survivability through mobility and allowing it to be deployed from diverse locations.

31. (1) I, II, III, and V only
The first indigenous ballistic missile provided a foundation for the strategic arsenal. Meanwhile, the air defense system was designed to engage multiple threats simultaneously using advanced radar. The anti-tank weapon uses infrared technology for autonomous guidance after launch. Both the medium-range and short-range systems were conceptualized for surface-to-air roles. However, the short-range system was eventually discontinued rather than becoming the navy's primary defense.

32. (2) Surface-to-Surface Battlefield Missile
This system was developed to provide the military with a tactical strike capability on the battlefield. It is a short-range ballistic missile designed to hit land-based targets from a ground launcher. It was the first system to be successfully developed under the integrated guided missile program. Different variants were later produced to meet

NODIA

the specific requirements of the army, air force, and navy.

33. (2) Enemy aircraft and aerial drones
This medium-range surface-to-air missile system is designed to protect vulnerable areas and mobile formations from various aerial threats. It can intercept helicopters, fighter jets, and unmanned aerial vehicles with high precision. By using advanced radar for tracking and guidance, it provides a comprehensive shield against air attacks. Its ability to engage multiple targets simultaneously makes it a crucial component of national air defense.

34. (1) It is a third-generation anti-tank guided missile (ATGM)
This weapon system is designed to destroy modern main battle tanks equipped with heavy armor. It features a sophisticated imaging infrared seeker that allows it to operate autonomously after being fired, a capability often described as fire-and-forget. It can be launched from both land-based vehicles and helicopters. This system ensures that ground forces can effectively neutralize enemy armored threats without needing to remain exposed during guidance.

35. (3) Short-range quick reaction surface-to-air engagement
This project was intended to create a fast-response missile system capable of intercepting low-flying aerial targets at close distances. Its primary role was point defense for naval ships and army units against incoming missiles and aircraft. Although it incorporated advanced technology for its time, it faced significant development challenges. It was eventually closed as a formal project after serving as a technology demonstrator for subsequent systems.

36. (4) Ramjet propulsion
The ability of this air defense missile to maintain high speeds throughout its flight is due to its specialized engine design. Unlike conventional rockets, this system uses atmospheric oxygen for combustion, which improves efficiency and sustained thrust. This technology allows the missile to travel at supersonic speeds to intercept fast-moving aerial targets effectively. It represents a significant indigenous achievement in aeronautical engineering and missile propulsion.

37. (3) Both statements are correct
This helicopter-launched anti-tank weapon is an advanced adaptation of the Nag missile system. It is designed for integration with indigenous helicopters to provide an airborne strike capability against armored targets. While the army uses the standard version, the variant developed specifically for the air force carries a different name. Both versions utilize the same infrared imaging technology to ensure high accuracy and lethality during combat missions.

38. (2) Trishul
Among the five original projects, this short-range surface-to-air missile encountered several technical difficulties that delayed its induction. While it achieved some success in trials, the project was eventually officially delinked from full-scale operational service. It served more as a technology demonstrator, providing valuable insights into radar and guidance systems that were later used to improve other indigenous missile programs and subsequent air defense developments.

39. (4) Prithvi-III : Indian Navy (Dhanush)
This ballistic missile series was adapted for use by different branches of the armed forces. The first version was designed for the army, while the second version was optimized for the air force. The third variant is a naval version launched from ships, commonly referred to by its own unique name. These adaptations ensure that all services possess a reliable short-range strike capability for tactical defense.

40. (1) Area air defence for mobile army formations and vulnerable areas
This weapon system is primarily deployed to provide a defensive umbrella against aerial attacks. It protects high-value assets and ground troops by intercepting enemy aircraft and missiles before they can reach their targets. Its mobility allows it to move alongside army units, ensuring continuous protection during operations. This role is essential for maintaining air superiority and safeguarding critical infrastructure from diverse and evolving aerial threats.

41. (3) NPO Mashinostroyenia, Russia
This supersonic cruise missile is the result of a successful international collaboration between

Click Here to Buy book on Amazon

the Indian defense research organization and a Russian aerospace entity. This partnership combined expertise in missile design and propulsion to create one of the world's fastest cruise missiles. The name itself reflects the fusion of two prominent rivers from both nations, symbolizing the deep strategic and technical cooperation involved in this project.

42. (1) A-ii, B-iv, C-i, D-iii
This versatile cruise missile can be deployed from various military platforms. On naval ships, it is launched from vertical or inclined systems. Submarines can fire it while submerged through specialized tubes. For aerial operations, it is integrated with heavy fighter jets like the Su-30 MKI. Additionally, land-based versions are operated from heavy-duty mobile trucks, providing a flexible and powerful strike capability across different domains.

43. (1) II, IV, I, III
Aerodynamic speeds are categorized based on their relation to the speed of sound. Speeds below this threshold are considered subsonic. As an object approaches the speed of sound, it enters the transonic phase. Exceeding this limit results in supersonic flight. Finally, speeds that are much higher, typically more than five times the speed of sound, are classified as hypersonic. This sequence is fundamental in aerospace engineering.

44. (3) Mach 2.8
This cruise missile is renowned for its high velocity, which is nearly three times the speed of sound. Traveling at this rate makes it extremely difficult for modern air defense systems to intercept it. Its supersonic speed is maintained throughout the flight, providing a significant tactical advantage by reducing the reaction time available to the enemy. This performance is enabled by a specialized two-stage propulsion system.

45. (3) Solid propellant booster followed by a liquid ramjet engine
The flight profile of this supersonic missile involves two distinct stages of propulsion. Initially, a solid-fuel rocket motor accelerates the missile to supersonic velocities. Once this speed is achieved, a liquid ramjet engine takes over, allowing for sustained high-speed flight within the atmosphere. This combination is crucial for maintaining the missile's ability to cruise at Mach 2.8 while performing maneuvers to evade enemy defensive systems.

46. (4) It allowed India to extend the range beyond 300 km
Before joining this international regime, there were restrictions on the transfer of technology for missiles with ranges exceeding three hundred kilometers. Upon becoming a member, India gained the ability to collaborate on and develop longer-range versions of this supersonic cruise missile. This diplomatic and technical milestone enabled the enhancement of the missile's operational reach, significantly strengthening the nation's long-distance precision strike capabilities.

47. (1) It cannot be launched from underwater platforms
This cruise missile is highly versatile and has been successfully tested for launches from submarines while they are submerged. It also operates on a fire-and-forget principle, meaning it does not require further guidance after launch to hit its target. While it has a low radar signature, statements claiming it is entirely uninterceptable are generally considered hyperbolic, as defensive technologies continue to evolve.

48. (2) It stays in the atmosphere and flies in a guided path
Unlike ballistic missiles that follow a high-altitude parabolic trajectory, this type of missile behaves more like an unmanned aircraft. It remains within the Earth's atmosphere for the duration of its flight and can be continuously guided to its target. It can perform complex maneuvers and fly at low altitudes to avoid radar detection, making it a highly effective tool for precision strikes.

49. (2) Brahmaputra and Moskva
The name of this advanced supersonic cruise missile is a portmanteau derived from two significant rivers. It honors the Brahmaputra in India and the Moskva in Russia, reflecting the joint venture between the two nations. This nomenclature symbolizes the strategic partnership and shared scientific effort that led

NODIA

to the development of one of the world's most capable and feared cruise missile systems.

50. (1) Philippines
This Southeast Asian nation became the first international customer to officially sign a contract for the purchase of this supersonic cruise missile system. The deal represents a major milestone for the Indian defense export industry, showcasing the global competitiveness of its indigenous technology. The acquisition is intended to enhance the coastal defense and maritime security capabilities of the purchasing country using this highly advanced weapon.

51. (4) I, II, and III
India's initial foray into nuclear testing occurred in 1974 at a specialized range in the Rajasthan desert. The operation was known by a famous codename and was presented to the world as an experiment for peaceful purposes. By successfully detonating the device, the country demonstrated its scientific capability in nuclear physics. This event was a landmark moment in national history, signaling the beginning of strategic autonomy.

52. (1) Both A and R are true and R is the correct explanation of A
Following the series of nuclear explosions in 1998, major global powers responded with significant economic penalties. These nations believed that such tests undermined international efforts to prevent the spread of nuclear weapons. Although India had not signed the non-proliferation treaty, the tests were seen as a challenge to the established global order. The resulting sanctions were a direct diplomatic consequence of India's decision to declare its nuclear status.

53. (2) May 18, 1974
The first successful detonation of a nuclear device by India took place on this specific day in the mid-seventies. Conducted in the Pokhran region of Rajasthan, the test proved the country's indigenous scientific and technical expertise. This milestone occurred during the Buddha Purnima festival, which also influenced the codename chosen for the operation. It established the nation's capability to harness nuclear energy for strategic purposes.

54. (2) Operation Shakti
The series of five nuclear tests conducted in May 1998 was carried out under this specific operational name. These tests included both fission and thermonuclear devices, showcasing a wide range of sophisticated nuclear capabilities. The success of this mission led to the country officially declaring itself a nuclear-weapon state. It was a pivotal moment that redefined the national security doctrine and established a credible strategic deterrent.

NODIA

55. (3) Both statements are correct
The nuclear tests conducted in 1998 were comprehensive, involving the successful detonation of multiple devices, including a powerful thermonuclear bomb. These events were a declaration of the nation's mature nuclear capabilities and its transition to a declared nuclear-weapon state. This move was intended to ensure national security through a credible deterrent, leading to significant shifts in both domestic policy and international diplomatic relations during that era.

56. (1) The technology was for non-military uses like mining
By using this specific terminology, the government aimed to clarify that the 1974 nuclear test was intended for constructive civil applications. This included potential uses in large-scale engineering projects, such as creating harbors or facilitating deep-ground mining. The designation was a diplomatic effort to signal that the country was focused on harnessing atomic energy for national development rather than purely for building an offensive weapons arsenal.

57. (3) France
While several major nations like the United States and Japan reacted to the 1998 nuclear tests by imposing immediate economic and technological penalties, this European country took a different approach. It chose not to join the initial wave of sanctions, emphasizing instead the importance of strategic dialogue. This stance reflected a more nuanced diplomatic perspective on India's security concerns and its right to develop indigenous defensive capabilities.

58. (1) Dr. Raja Ramanna - Pokhran-I (1974)
This distinguished scientist was the primary leader and architect behind the first nuclear test conducted by India. His expertise was instrumental in the successful design and detonation of the 1974 device. While other prominent figures led the subsequent 1998 tests, his early contributions laid the foundational scientific framework for the national nuclear program. His role remains a central part of the history of India's strategic scientific achievements.

59. (4) India announced a doctrine of "No First Use."
Following the declaration of its nuclear weapon status, the country formulated a clear strategic policy to guide the usage of its arsenal. A key pillar of this doctrine is the commitment not to initiate a nuclear strike against any adversary. This stance is intended to project a responsible image and prevent accidental escalation while maintaining a credible deterrent. It remains a fundamental aspect of the national security framework.

60. (2) Signing of the Indo-US Civil Nuclear Agreement
Despite the initial period of isolation and sanctions, the long-term diplomatic outcome was a recognition of India as a responsible nuclear power. This led to a historic agreement that allowed for international cooperation in civilian nuclear energy. This deal ended decades of technology denial and integrated the country into the global nuclear commerce framework. It represented a major shift in the strategic relationship between the two democratic nations.

61. (2) I, II, and III only
The core principles of the national nuclear strategy include a commitment to not using such weapons first. It also emphasizes maintaining a sufficient yet minimal arsenal to ensure deterrence. In the event of an attack, the doctrine specifies a massive retaliatory strike to cause unacceptable damage. However, the policy explicitly forbids the use of nuclear weapons against non-nuclear states or initiating pre-emptive strikes against them.

62. (1) A-iv, B-i, C-ii, D-iii
The commitment not to initiate nuclear warfare is defined by the first use policy. Maintaining a necessary but limited arsenal ensures a credible deterrent. A strike intended to cause immense damage in response to an attack is known as massive retaliation. Finally, the decision-making process for utilizing these weapons is managed by a specific command authority. These terms form the structural basis of the nation's strategic defense posture.

63. (4) 2003
Although the principles were discussed following the 1998 tests, the formal adoption and public release of the detailed doctrine occurred in early 2003. This document clarified the command structure and the operational guidelines for the country's strategic forces. It was a significant step in institutionalizing the nuclear deterrent and communicating a transparent and responsible nuclear policy to the international community and domestic stakeholders alike.

64. (2) A survivable arsenal capable of inflicting unacceptable damage
This concept focuses on possessing enough nuclear capability to prevent an adversary from attacking. It does not require a massive arms race or achieving numerical parity with other global powers. Instead, the emphasis is on having a reliable and survivable force that can survive a first strike and respond with sufficient power to make any aggression against the nation prohibitively costly and strategically disadvantageous.

65. (2) Statement II is correct but Statement I is incorrect
While the general policy is to avoid the initial use of nuclear weapons, there is a specific exception regarding other weapons of mass destruction. In the event of a major attack using biological or chemical agents, the nation retains the right to respond with its nuclear arsenal. This nuance ensures that the deterrent remains effective against all types of catastrophic threats, not just those involving nuclear devices.

66. (1) The Executive Council
Within the structure of the nuclear command, this specific body is responsible for providing inputs and ensuring that the decisions made by the political leadership are carried out. It acts as a bridge between the policy-makers and the operational military units. By handling the technical and administrative aspects of

Downloaded from www.pdf.tube

command, it facilitates the orderly and authorized management of the country's most powerful and sensitive weapon systems.

67. (3) Prime Minister of India
The ultimate authority to authorize the use of nuclear weapons rests with the head of the government. As the leader of this council, this individual makes the final decision on strategic matters of national importance. This structure ensures that nuclear weapons remain under firm civilian control, reflecting the democratic values of the nation. It is a critical component of the organized and responsible management of the nuclear deterrent.

68. (4) It manages and administers all strategic nuclear forces and delivery systems
This specialized military command is responsible for the actual operation and maintenance of the nation's nuclear arsenal. It ensures that delivery systems, such as missiles and specialized aircraft, are ready for deployment if authorized by the civilian leadership. By providing a dedicated and professional force for these strategic assets, it maintains the credibility of the deterrent and oversees the security and safety of the nuclear stockpile.

69. (3) India commits to lowering the threshold for nuclear weapons usage in tactical border conflicts
The stated policy focuses on maintaining a high threshold for the use of nuclear weapons, emphasizing that they are for deterrence rather than battlefield use. The doctrine clearly states that retaliation will be massive and that these weapons will not be used against non-nuclear states. Additionally, the nation remains committed to global disarmament. Suggestions that the policy encourages early use in local conflicts are fundamentally incorrect.

70. (2) National Security Advisor
This high-ranking official leads the body responsible for executing the directives of the political leadership regarding the nuclear arsenal. In this role, the individual coordinates between various scientific, military, and administrative entities to ensure the readiness and effectiveness of the deterrent. This chairmanship highlights the central role of national security planning in the management and oversight of the country's strategic and most sensitive defensive capabilities.

71. (2) I, II, and III only
This historic vessel is the first aircraft carrier designed and built entirely within the country. It was constructed by a shipyard in Kochi and utilizes a specialized configuration for launching and recovering aircraft. This system involves a ramp for take-offs and wires for landings. It is equipped to operate modern fighter jets and various helicopters. Statements claiming it was built in Mumbai by a different shipyard are incorrect.

72. (1) IAC-1 (Indigenous Aircraft Carrier 1)
During the stages of conceptualization and construction, this massive naval project was referred to by a specific technical label indicating its status as the first locally made carrier. This designation highlighted the nation's goal of achieving self-reliance in the production of complex capital warships. Once commissioned into the fleet, it was given its official name, reviving a legendary title from the navy's history for a new era.

73. (3) Cochin Shipyard Limited, Kochi
The construction of this massive aircraft carrier was undertaken by a specialized shipyard located on the southwestern coast of the country. This facility successfully managed the immense technical challenges of building a vessel of this scale and complexity. By completing this project, the shipyard demonstrated its advanced engineering capabilities and solidified its position as a key player in the nation's efforts to modernize its naval forces indigenously.

74. (2) Statement II is correct but Statement I is incorrect
The carrier does not use a catapult system to launch its aircraft; instead, it features a specialized ski-jump ramp to assist in take-offs. For landing, the flight deck is equipped with an angled configuration and arresting cables that snag the aircraft's hook. This combination allows for the successful operation of fixed-wing fighters from the ship. Suggestions that it uses steam or electromagnetic catapults for launching planes are false.

NODIA

75. (4) Rely on a high thrust-to-weight ratio to launch off the ski-jump
This specific method of aircraft operation requires planes to have powerful engines relative to their weight. The upward-curving ramp at the end of the flight deck provides the necessary lift for the aircraft to transition into flight without the need for mechanical catapults. This design simplifies the carrier's machinery while demanding high performance from the fighter jets, ensuring they can take off effectively from the relatively short deck.

76. (2) Boeing C-17 Globemaster
The flight deck of an aircraft carrier is designed to handle specialized naval fighters and various types of helicopters. Large, land-based strategic transport planes are far too heavy and large to operate from such a platform. While the carrier can support indigenous light combat aircraft and specialized naval jets, it is physically impossible for a massive cargo aircraft to land or take off from its deck during standard maritime operations.

77. (3) Full load displacement : Approx. 45,000 tonnes
This massive vessel is one of the largest warships ever built in the country, with a total weight when fully loaded of about forty-five thousand tonnes. It is powered by conventional gas turbines rather than nuclear energy. It is capable of reaching speeds well above fifteen knots and has a long operational range. These specifications make it a formidable platform for projecting maritime power and providing air cover over vast oceanic distances.

78. (4) Courageous
The name given to this premier aircraft carrier is rooted in ancient language and carries a powerful meaning associated with bravery and valor. It reflects the ship's role as a symbol of national pride and strength. By choosing this name, the navy honors the legacy of its predecessor while signifying the bold step taken towards indigenous maritime technology. It represents the spirit of the personnel who serve aboard this vessel.

79. (1) It provides the capability to deploy a carrier battle group on both seaboards
The addition of a second operational aircraft carrier allows the navy to maintain a powerful presence on both the eastern and western coasts simultaneously. This ensures that a carrier strike group is available even when one ship is undergoing maintenance. Such a capability is vital for a blue-water navy seeking to protect maritime interests across the entire Indian Ocean region and beyond, significantly enhancing national naval power projection.

80. (2) India can now design and build complex aircraft carriers indigenously
The successful completion of this project places the nation among an elite group of countries capable of manufacturing such advanced naval platforms. It demonstrates the growth of the domestic shipbuilding industry and the ability to integrate sophisticated aeronautical and naval systems. This achievement significantly reduces reliance on foreign builders and allows for the customization of future warships to meet specific national security needs and evolving maritime challenges.

81. (1) I and II only
This main battle tank was developed by the specialized combat vehicles laboratory under the defense research organization. It is notable for utilizing a unique composite protection system designed domestically. While several versions of the tank have been produced, the latest iteration is actually significantly heavier than its predecessor due to numerous upgrades. It was not designed as a light tank for high-altitude use, which is a different category of vehicle.

82. (1) A-ii, B-i, C-iv, D-iii
The tank features a powerful hundred-and-twenty-millimeter rifled gun for its primary strike capability. Protection is provided by modular composite armor developed in national laboratories. Mobility is enabled by a high-performance diesel engine from a foreign partner. For defense against aerial threats and infantry, it is equipped with a secondary machine gun. These components combine to make it a lethal and well-protected platform for modern ground combat and battlefield operations.

83. (1) II, IV, I, III
The history of armored vehicles in the military began with early models like the Vijayanta. This was followed by the introduction of the reliable

Click Here to Buy book on Amazon

T-72 platform. Later, the more advanced T-90 was added to the inventory. Finally, the indigenous Arjun main battle tank reached its operational stage. This sequence reflects the gradual evolution from imported and licensed platforms to the development of sophisticated domestic tank technology for ground forces.

84. (4) Combat Vehicles Research and Development Establishment (CVRDE) under DRDO
The design and engineering of this indigenous main battle tank were led by a specialized laboratory focused on armored platforms. This institution coordinated with various other research centers and industrial partners to integrate advanced technologies like composite armor and rifled guns. While manufacturing involves other entities, the primary responsibility for development and testing lies with this research establishment. It represents a significant achievement for the country's defense science and engineering sector.

85. (3) Heavy tank (over 65 tons)
Due to its extensive armor and large main gun, this main battle tank is one of the heaviest in the world. Weighing over sixty-five tons, it provides exceptional crew protection and firepower. However, this weight also presents challenges for transport and movement across certain types of terrain. It is categorized as a heavy tank, distinguishing it from the lighter platforms often used in mountainous regions or for rapid deployment missions.

86. (2) Statement II is correct but Statement I is incorrect
This advanced protection system is a composite material rather than just a layer of explosive reactive blocks. It is designed to withstand multiple types of anti-tank rounds, including those that use high-speed penetrators or shaped charges. By layering different materials, it provides superior defense compared to traditional steel armor. This indigenous development was a critical breakthrough that allowed the national main battle tank to achieve high levels of survivability on the battlefield.

NODIA

87. (4) Fin Stabilised Armour Piercing Discarding Sabot (FSAPDS)
This specialized ammunition is designed to penetrate the thickest enemy armor using kinetic energy. It features a long, dense rod that is stabilized in flight by fins after the surrounding casing is shed upon leaving the barrel. This type of round is the primary tool for a main battle tank to engage and destroy other tanks at long distances. It utilizes the high muzzle velocity provided by the tank's rifled gun for maximum effect.

88. (1) Its overall weight has been significantly reduced to 50 tons
The updated version of the main battle tank actually incorporates many new features that have increased its weight rather than reducing it. It includes an enhanced capability for identifying and engaging targets, as well as improvements to its suspension and mine-clearing tools. These additions make it more effective in combat but also place it firmly in the heavy category. Claims of a significant weight reduction to fifty tons are factually incorrect.

89. (3) Germany
The propulsion system for the original version of this indigenous tank was sourced from a leading European manufacturer known for high-performance diesel engines. This powerful motor provides the necessary mobility for the heavy armored vehicle. While other components of the tank are developed domestically, the engine was one of the key imported subsystems integrated into the design. Efforts are continuing to further increase the indigenous content of future powerplants for the tank series.

90. (1) Leopard
This particular armored vehicle is a well-known main battle tank developed and used by various European nations. It is not part of the Indian military's inventory, which primarily consists of domestic designs like the Arjun and Zorawar, as well as licensed versions of the T-series. The other tanks listed are either currently in service or in various stages of development for the national ground forces, making the European model the exception.

91. (2) I and III only
This modern fighter jet features a single-engine design and a specialized wing shape that lacks a traditional tail. It utilizes a sophisticated electronic control system to maintain stability and agility during flight. This technology replaces mechanical links with digital signals, allowing for precise handling. While it is a highly capable combat aircraft, it is categorized as a light fighter rather than a heavy twin-engine platform. Statements claiming it has two engines are incorrect.

92. (1) Both A and R are true and R is the correct explanation of A
The design of this combat aircraft intentionally makes it unstable in flight. This aerodynamic characteristic allows the plane to change direction much more rapidly than a traditional stable design, giving it superior agility in dogfights. To manage this instability and make the aircraft flyable for the pilot, a sophisticated computer-based control system is used. This combination of aerodynamic instability and advanced electronic control is a hallmark of modern high-performance fighter jets.

93. (3) Aeronautical Development Agency (ADA)
The responsibility for the design and program management of this indigenous light fighter was assigned to a specialized agency created for this purpose. This body worked closely with various research laboratories and manufacturing units to bring the complex project to fruition. While other entities are involved in the actual production of the aircraft, this agency remains the primary designer and authority for the ongoing development of the fighter's different versions and upgrades.

94. (4) Fly-by-wire digital flight control system
Because the aircraft's design is inherently unstable to improve its agility, it requires a constant stream of computer-managed adjustments to stay level. This technology replaces traditional mechanical cables with an electronic interface. It monitors pilot inputs and flight conditions thousands of times per second to provide a smooth and controlled experience. This system is essential for the safe operation of modern, highly maneuverable fighter jets that would otherwise be impossible for a human to control.

95. (1) Statement I is correct but Statement II is incorrect
A significant portion of the aircraft's structure is made from advanced carbon-fiber materials. These composites are used because they are much lighter than traditional aluminum while maintaining high strength. This weight reduction allows for better performance and fuel efficiency. Furthermore, these materials also help in reducing the aircraft's visibility on radar. Suggestions that the use of composites increases the weight of the aircraft are incorrect, as their primary benefit is lightness.

96. (2) Electronic displays rather than traditional analog dials
Modern aircraft use digital screens to provide the pilot with all necessary flight and combat information. This replaces the numerous mechanical gauges and dials found in older jets. These electronic displays can be customized to show specific data depending on the mission phase, which reduces the pilot's workload and improves situational awareness. This transition from analog to digital instrumentation is what defines this advanced cockpit technology in contemporary high-performance combat aircraft.

97. (2) Tejas Strategic Bomber
The light combat aircraft was designed as a multi-role fighter for air defense and close air support missions. While various versions have been developed for training and naval operations, there is no plan to turn this small, agile platform into a large strategic bomber. Such a role requires an entirely different class of aircraft with much greater size and payload capacity. The program focuses on fighter, trainer, and carrier-based variants instead.

98. (1) Radar : Uttam AESA radar (indigenous)
The updated version of the fighter features a sophisticated indigenous radar system that provides superior tracking and targeting capabilities. While the aircraft uses an engine from a foreign supplier and seats from a specialized British manufacturer, the radar is a major domestic achievement. It allows the jet to detect multiple threats at long ranges. The integration of this advanced electronic system significantly enhances the combat effectiveness of the light fighter for modern air operations.

Downloaded from www.pdf.tube

99. (3) Supersonic combat aircraft
This indigenous jet is notable for being one of the smallest and most lightweight planes in its category. Despite its size, it is capable of traveling faster than the speed of sound and carrying a wide array of modern weapons. It was specifically designed to be a highly maneuverable multi-role platform for air-to-air and air-to-ground missions. This combination of small footprint and high performance makes it a unique asset for the national air force.

100. (4) To replace the aging fleet of MiG-21 fighters
When the program was first conceived several decades ago, its primary goal was to create a modern domestic alternative to the vast number of older Soviet-made jets. These aging aircraft were the backbone of the air force and needed a capable successor that could be produced locally. The indigenous fighter was designed to provide a versatile and technologically advanced platform to maintain air superiority and modernize the country's tactical combat aircraft inventory.

101. (1) I, II, and III only
This advanced artillery system is a towed howitzer with a hundred-and-fifty-five-millimeter caliber. It was developed through a successful partnership between national laboratories and several private sector engineering firms. The gun has demonstrated an exceptional firing range during trials, setting records for its class. It is designed to be moved by a vehicle and is not a self-propelled platform like a tank. The project showcases the strength of indigenous collaborative defense research and manufacturing.

102. (1) A-iii, B-ii, C-iv, D-i
The ATAGS is a locally developed towed gun with a long-range capability. The K9 Vajra is a tracked, self-propelled howitzer. The Dhanush represents an upgraded indigenous version based on an older European design. Finally, the M777 is a lightweight gun imported for use in difficult terrain. These varied systems provide the army with a flexible artillery force capable of operating in different environments, from plains and deserts to high-altitude mountainous regions.

103. (3) 155 mm / 52 calibre
This powerful artillery gun uses a barrel with a diameter of one hundred and fifty-five millimeters. The length of the barrel is fifty-two times its diameter, a specification that allows for high muzzle velocity and a significantly extended firing range. This combination of caliber and length is a standard for modern heavy artillery, ensuring that the system can provide effective and precise fire support over long distances during various types of combat operations and battlefield scenarios.

104. (1) DRDO design transferred to private industry for manufacturing
The project followed a collaborative approach where the design and core technology were created by national research laboratories. This expertise was then shared with prominent private engineering firms, who handled the actual production and assembly. This model encourages the growth of a domestic defense industrial base and utilizes the strengths of both government and private sectors. It is a key example of how indigenous innovation can be scaled up for mass military production and deployment.

105. (3) Both statements are correct
During rigorous testing, this artillery system proved its ability to hit targets at distances of nearly fifty kilometers. This impressive reach is complemented by an automated system for loading ammunition, which allows the crew to fire multiple rounds in quick succession. These features together provide a high volume of accurate fire, significantly increasing the tactical effectiveness of the gun on the battlefield. It represents a major advancement in the nation's indigenous long-range artillery capabilities and technology.

106. (1) High reliability and reduced maintenance over hydraulic systems
The use of electrical systems to move the gun and its components offers several advantages over traditional fluid-based mechanisms. These systems are generally more reliable in extreme weather conditions and require less frequent servicing. By eliminating the need for complex hydraulic pipes and pumps, the overall maintenance burden is reduced. This modern design choice ensures that the artillery piece remains operational for longer periods during intense military deployments and challenging field conditions across various terrains.

NODIA

107. (4) It lacks an APU and must be towed for minor shifts
While the gun possesses many advanced features like a high rate of fire and a large chamber for powerful charges, it does include an auxiliary power unit. This unit allows the gun to move itself short distances without needing a towing vehicle, which is a significant advantage. Statements claiming that the system lacks this self-propulsion capability for minor adjustments are incorrect. The inclusion of such power units is a standard feature in modern heavy towed artillery.

108. (2) Aatmanirbhar Bharat (Self-reliant India)
This artillery project is a centerpiece of the national drive to achieve independence in defense manufacturing. By designing and building a world-class weapon system within the country, it reduces the need for expensive foreign imports. It showcases the ability of domestic scientists and private companies to collaborate on high-technology military hardware. The success of this gun is a significant step toward the goal of making the nation self-sufficient in its strategic and conventional military requirements.

109. (3) It provides "shoot and scoot" capability for quick repositioning
The integration of an advanced targeting computer and an internal power source allows the gun to be prepared for firing and then moved quickly. This ability is vital for surviving on a modern battlefield, where enemy radar can quickly locate an artillery position after it fires. By firing a few rounds and then rapidly shifting to a new location, the gun avoids counter-fire. These technologies together greatly enhance the survivability and tactical flexibility of the artillery unit.

110. (4) Bofors FH-77
This specific artillery system was originally purchased from a European nation in the late twentieth century. While it has been widely used by the military, it is not an indigenous design. In contrast, the other listed systems are either entirely domestic developments or represent significantly upgraded versions produced locally. The foreign-sourced gun stands out as the exception in a list otherwise focused on the nation's growing capabilities in the design and production of its own artillery hardware.

111. (1) I, II, III, and V only
The national space agency was formally established in 1969, building upon earlier research committees. It was led by a visionary first chairman and remains under the direct supervision of the Prime Minister's office. While it has many centers across the country, its primary launch site is located on an island off the eastern coast, not in the southern city mentioned. Statements describing its formation, leadership, and administrative structure are accurate reflections of its organizational history.

112. (2) Indian National Committee for Space Research (INCOSPAR)
Before the formal creation of the current space organization, activities were managed by an initial committee formed in the early sixties. This group laid the foundation for atmospheric and space research. In 1969, it was reorganized into the present body to better manage the growing complexity of the country's space program. This transition marked the beginning of a more structured and ambitious era of satellite development and launch vehicle technology to meet national development goals.

113. (2) Dr. Vikram Sarabhai
This eminent scientist is widely recognized for his visionary role in starting the nation's space journey. He believed that space technology should be used for the direct benefit of society, particularly in areas like communication and education. His efforts led to the creation of the national space agency and the development of early research facilities. His legacy continues to guide the organization's mission to leverage space science for the socio-economic progress of the country.

114. (1) Statement I is correct but Statement II is incorrect
The primary goal of the space agency has always been to apply advanced technology to solve national challenges and aid development. This includes areas such as weather forecasting, remote sensing, and telecommunications. However, the organization's focus is primarily on civil and scientific exploration rather than the

Click Here to Buy book on Amazon

development of manned military space stations. While it works on human spaceflight, the mission objectives are scientific and technological in nature, aimed at expanding the nation's presence in space.

115. (3) Department of Space (DoS)
The organization operates under a dedicated government division that reports directly to the highest level of leadership. This administrative structure ensures that space research remains a high priority and receives the necessary policy support and funding. By being part of this specialized department, the agency can coordinate its various activities and laboratories across the country effectively. This direct link to the central government facilitates the long-term planning and execution of ambitious space exploration missions.

116. (4) Vikram Sarabhai Space Centre (VSSC) : Launch vehicle design and development
This major facility located in the south is the lead center for creating the rockets that carry satellites into space. It handles the engineering and testing of both solid and liquid propulsion systems. Other centers focus on different aspects, such as satellite manufacturing or ground-based applications. The specialization of these hubs allows for a comprehensive approach to space technology, ensuring that all components from the launch vehicle to the spacecraft payload are developed with high precision.

117. (3) IN-SPACe is the sole manufacturer of ISRO's solid rockets
Several entities handle the commercial aspects of the space program, helping to transfer technology to domestic industries and manage international launch contracts. However, the role of the regulatory body mentioned is to enable and oversee private participation in the space sector, not to be the exclusive manufacturer of rocket components. Manufacturing is shared among various government units and private companies. These commercial arms aim to build a strong industrial ecosystem to support the national space mission.

118. (2) Policy formulation and oversight of the Indian space programme
This high-level body is responsible for setting the strategic direction and overall policies of the country's space activities. It reviews the progress of various missions and ensures that the program aligns with national objectives. While other agencies handle the technical work of launching and operating satellites, this commission provides the necessary guidance and administrative supervision. Its work is essential for the organized and effective development of the nation's space capabilities over the long term.

119. (4) Emphasizing space applications for societal benefits like telecom
The early direction of the space program was heavily influenced by a belief that technology should directly improve the lives of citizens. Rather than pursuing prestige-driven races, the focus was placed on practical uses like education, television broadcasting, and resource management. This unique approach led to the development of sophisticated communication and remote sensing satellites that have played a crucial role in the country's modernization. This people-centric philosophy remains a core value of the organization today.

120. (1) Monitoring and controlling geostationary and geosynchronous satellites
These specialized facilities at two different locations are responsible for the health and orbital management of communication satellites. They perform maneuvers to keep the spacecraft in their correct positions and monitor their various subsystems. This constant supervision is necessary to ensure that services like television broadcasting and telecommunications remain uninterrupted. These centers act as the vital ground link that maintains the operational integrity of the nation's extensive and sophisticated satellite network in high-altitude orbits.

121. (4) I, II, and III
This versatile rocket is a four-stage system that alternates between using solid and liquid fuels for its propulsion. Because of its high success rate and reliability over many years, it is often called the mainstay of the national space agency. It has been used for a wide variety of missions,

Downloaded from www.pdf.tube

including Earth observation and interplanetary travel. Its consistent performance has made it a preferred choice for launching both domestic and international satellites into polar orbits.

122. (1) A-iii, B-iv, C-i, D-ii
The early experimental rocket provided the first successful domestic launch. The later mainstay vehicle was the first to incorporate liquid stages. Modern heavy launchers utilize advanced cryogenic engines for carrying larger satellites. The most powerful variant is specifically designed for the heaviest payloads, enabling the placement of massive communication satellites into high orbits. This progression highlights the steady growth in the country's ability to reach different levels of space with increasingly complex and capable rocket technology.

123. (1) III, II, IV, I
The ability to carry weight into low orbit varies significantly between different rockets. A small, new launcher is designed for light payloads, followed by the mid-range performance of the long-standing workhorse. The standard heavy launcher provides greater capacity, while the most powerful variant currently in service can carry the largest weight. This sequence reflects the range of options available for different types of missions, from small research satellites to large strategic and commercial spacecraft.

124. (3) Solid, Liquid, Solid, Liquid
The propulsion architecture of this four-stage rocket involves an alternating pattern of fuel types. The first and third stages use solid motors to provide powerful thrust, while the second and fourth stages utilize liquid engines for precise control and sustained performance. This unique configuration has proven to be highly reliable and efficient for a wide range of missions. Each stage plays a specific role in lifting the payload through the atmosphere and placing it into its intended orbit.

125. (3) Development and successful flight of an indigenous Cryogenic Upper Stage
Achieving the capability to use extremely cold liquid fuels was a major technological hurdle. These engines provide much higher efficiency than traditional rockets, allowing for the launch of heavier satellites into very high orbits. After years of research and testing, the successful use of a locally built version of this technology was a historic achievement. It ended reliance on foreign engines for high-altitude missions and significantly boosted the nation's strategic and commercial space capabilities.

126. (1) Statement I is correct but Statement II is incorrect
This reliable liquid-fueled engine is a critical component of several major rockets used by the space agency. It provides the necessary power for the second stages of these vehicles. However, it does not use the extremely cold fuels typical of cryogenic engines. Instead, it relies on propellants that can be stored at normal temperatures. This engine has a long history of successful flights and remains a cornerstone of the country's liquid propulsion technology and satellite launch capacity.

127. (1) Two solid strap-on boosters, a core liquid stage, and a cryogenic upper stage
The design of this heavy launcher is built around a central liquid-fueled stage that is assisted by two massive solid rocket motors attached to its sides. For the final phase of its journey, it uses a sophisticated high-performance engine that runs on extremely cold liquid fuels. This three-stage configuration provides the immense thrust needed to carry heavy communication satellites or human-rated capsules into space. It represents the most powerful and advanced launch system currently in the national inventory.

128. (2) It failed its very first developmental flight in 1993
While this rocket eventually became legendary for its reliability and success, its initial test flight did not go as planned. In 1993, the first attempt to launch the vehicle ended in failure due to a technical error. However, the agency quickly identified the problem and fixed it, leading to an incredibly successful career. Since then, it has launched famous missions to the moon and Mars, proving itself as one of the most dependable rockets in the world.

129. (2) Sun-Synchronous Polar Orbit
This rocket is primarily used to place Earth observation and remote sensing satellites into a specific high-latitude orbit. In this path, the

NODIA

satellite passes over the poles and stays in a constant position relative to the sun. This is ideal for imaging and monitoring the planet's surface under consistent lighting conditions. The rocket's precision in reaching this orbit has made it the global leader for such missions, serving both national needs and international commercial clients successfully for decades.

130. (1) Merlin
This specific engine is a high-performance liquid-fueled motor developed by a private American aerospace company for its own line of rockets. It is not part of the technology used by the national space agency, which relies on its own indigenous designs like the Vikas and cryogenic motors. The other listed items are all well-known components used in the country's various satellite launch vehicles, making the foreign-developed engine the clear exception in this group of propulsion systems.

131. (4) I, II, and III
The first lunar mission was launched in 2008 and successfully placed a spacecraft in orbit around the moon. It included a specialized probe that intentionally impacted the surface to study its composition. A major scientific achievement of this mission was the definitive detection of water molecules on the lunar surface, changing our understanding of the moon. These results were verified by multiple instruments and international partners, marking a major milestone for the national space program and global lunar science.

132. (1) Both A and R are true and R is the correct explanation of A
This complex mission had multiple components, and while one part failed, others were highly successful. The attempt to land a vehicle on the surface did not go as planned, resulting in a crash. However, the orbiting spacecraft was placed perfectly in lunar orbit and has continued to provide high-resolution images and scientific data for many years. Because of this mix of outcomes, the mission is recognized for its significant contributions despite the loss of the landing vehicle.

133. (3) NASA (USA)
This sophisticated instrument was one of the key payloads on the first lunar mission and was provided by the American space agency. It was specifically designed to map the minerals on the moon's surface and was instrumental in the discovery of water molecules. This collaboration highlights the international nature of space exploration and how different countries can work together to achieve major scientific breakthroughs. The data from this instrument provided a new perspective on the history and geology of the moon.

134. (2) GSLV Mk III (LVM3)
For this ambitious mission involving an orbiter, a lander, and a rover, the country's most powerful rocket was required. This heavy-lift vehicle successfully carried the large and complex spacecraft through the initial stages of its journey to the moon. Its ability to place such a heavy payload into a precise transfer orbit was a demonstration of the growing maturity of the nation's heavy launch technology. This rocket has since become the primary choice for deep space and manned missions.

135. (1) Statement I is correct but Statement II is incorrect
The failure of the previous landing attempt was traced to a software issue during the final descent phase. For the subsequent mission, significant changes were made to both the hardware and the software to ensure success. This included strengthening the landing legs and updating the control algorithms to handle a wider range of conditions. Suggestions that the later mission used an identical design without any modifications are incorrect, as those changes were critical to the successful landing near the south pole.

136. (1) Central engine removal and strengthening of landing legs
To improve the chances of a successful touchdown, several important modifications were made to the landing vehicle. One key change was the simplification of the propulsion system by removing a central engine, which allowed for better control and more fuel capacity. Additionally, the structural support for the landing was made much stronger to withstand a wider range of impact speeds. These improvements were based on the lessons learned

Click Here to Buy book on Amazon

from the previous attempt and were essential for the successful landing.

137. (3) Dedicated lunar orbiter payload module
Unlike the previous mission, this one did not carry a full-featured science orbiter. Instead, it used a propulsion module to carry the lander and rover to the moon's vicinity. Once the landing vehicle was released, the propulsion module stayed in orbit and carried a single scientific experiment. The focus of the mission was entirely on achieving a soft landing and conducting experiments on the surface, using the lander and rover as the primary platforms for scientific discovery and technological demonstration.

138. (1) Lunar Lander : Vikram
The vehicle designed to land softly on the lunar surface was named in honor of the father of the national space program. Meanwhile, the small six-wheeled vehicle that explored the surface was given a name meaning wisdom. Other terms were used for different parts of the mission or previous experiments. Correctly identifying these components is important for understanding the structure and history of the country's successful efforts to explore the moon and achieve complex technological milestones in deep space.

139. (4) Engine firing to allow capture by the Moon's gravity
When a spacecraft traveling from Earth reaches the moon, it is moving too fast to stay in orbit naturally. To be captured by the moon's gravity, the spacecraft must fire its engines in a specific direction to slow down. This critical maneuver allows it to transition from a journey through deep space into a stable path around the moon. Success in this step is essential for any mission that intends to study the moon from orbit or land on its surface.

140. (2) To demonstrate tech capabilities for planetary exploration and lunar study
The primary aim of these missions is to develop and prove the advanced technologies needed for landing on other worlds and exploring their surfaces. This includes mastering the complexities of deep space navigation, soft landing, and operating robotic vehicles in extreme environments. While the scientific data collected is valuable, the long-term goal is to build a foundation for future exploration and showcase the nation's maturity as a major spacefaring power capable of complex interplanetary missions and scientific discovery.

141. (1) I, II, and III only
The landing vehicle carried several specialized instruments to study the lunar environment. These included tools to measure the thermal properties of the soil, the plasma density near the surface, and any seismic activity or moonquakes. These experiments were designed to provide a better understanding of the moon's characteristics near its south pole. While other payloads were part of the overall mission, they were located on different components like the propulsion module or the mobile rover that explored the area.

142. (1) A-iv, B-i, C-ii, D-iii
Different instruments were assigned specific scientific tasks during the mission. One measured the temperature and heat conduction of the lunar soil, while another was designed to detect vibrations or seismic events. The mobile rover used its equipment to identify the chemical elements present in the rocks and dirt. Finally, an instrument on the lander studied the thin layer of gas and plasma near the surface. Together, these tools provided a comprehensive picture of the environment at the landing site.

143. (2) August 23, 2023
This specific day marked a historic achievement as the country successfully landed a spacecraft near the moon's southern pole. The perfect touchdown followed a complex series of maneuvers and was watched by millions around the world. It made the nation the first to reach this challenging and scientifically important region of the moon. This event was a major victory for the space agency and is now celebrated as a significant milestone in the country's scientific and technological history and progress.

144. (2) Shiv Shakti Point
Following the successful touchdown of the mission, the specific location where the vehicle landed was given an official name. This title was chosen to represent the combined strength and effort that led to the achievement. It has since become a permanent part of lunar geography, recognized in national and international

NODIA

records. Naming such landmarks is a tradition in space exploration to commemorate historic achievements and provide a lasting legacy for the teams of scientists and engineers involved.

145. (3) Both statements are correct
The region near the moon's south pole is highly valued by scientists because it contains craters that are always in shadow and may hold frozen water. Studying this area is essential for future long-term missions. By landing there, the country became the first to reach this specific part of the moon, although it was the fourth nation overall to achieve a soft landing on the lunar surface. This feat demonstrated exceptional technical precision and advanced capability in deep space exploration.

146. (1) Engine firing for tech validation of future return missions
Before the lander was shut down for the lunar night, it performed a brief maneuver where it fired its engines and lifted off the surface to move a short distance. This unexpected test was a major success as it proved that the vehicle could take off again after landing. This capability is a fundamental step toward future missions that aim to collect samples and bring them back to Earth or launch vehicles from the surface of another celestial body for exploration.

147. (3) Japan
While several major nations had reached the lunar surface in the past, including the Soviet Union, the United States, and China, others were still working toward this goal. At the time of the successful landing in 2023, this particular East Asian nation had not yet achieved a soft landing on the moon. This achievement placed the country in a very select group of global powers with the technology and expertise to successfully land and operate vehicles on another world's surface.

148. (4) National Space Day
To honor the historic success of the mission that landed near the moon's south pole, the government designated this day as a special annual celebration. It serves to inspire future generations and recognize the immense hard work of the scientists and engineers involved in the space program. This day commemorates the nation's growth into a leading spacefaring power and its commitment to exploring the frontiers of science and technology for the benefit of all humanity through peaceful space research.

149. (3) Lunar night onset, freezing temperatures, and no solar power
The mission was designed to operate for one lunar day, which lasts about two Earth weeks. When the sun went down at the landing site, the vehicles lost their source of energy and were exposed to extreme cold that they were not built to survive. While there was hope that they might wake up when the sun returned, the damage from the freezing night meant they stayed silent. This was the planned end for the primary phase of the successful mission.

150. (2) Shukrayaan-1
Most of the listed missions are part of a series dedicated to exploring the moon. This particular mission stands out because its target is a completely different planet. While the others have successfully reached or orbited the moon, this one is a future project aimed at studying the atmosphere and surface of Venus. This difference in target and mission class makes it the clear exception in a list otherwise focused on the country's long-running and successful lunar exploration program.

151. (1) I, II, III, and IV only
The mission to the red planet was launched in 2013 and achieved several major records. It made the nation the first in Asia to reach Mars and the first in the world to succeed on its initial attempt. The mission was also famous for being extremely cost-effective. However, it was an orbiter-only mission and did not include any landing vehicle. All statements regarding its launch date, cost, and historical significance are accurate, while the claim about a lander is incorrect.

152. (1) November 5, 2013
On this day, the mission to explore the red planet began with a successful lift-off from the national spaceport. The spacecraft started its journey using a reliable polar launch vehicle, which placed it into an initial orbit around Earth before it headed for Mars. This event marked the beginning of one of the most successful and celebrated chapters in the country's space history, eventually leading to

Downloaded from www.pdf.tube

a perfect entry into Martian orbit nearly a year later in 2014.

153. (3) The budget of the Hollywood movie 'Gravity'
One of the most talked-about aspects of the mission was how little it cost compared to other deep space projects. The total expense was famously noted to be less than the amount spent on producing a major space-themed film in the United States. This achievement highlighted the efficiency and ingenuity of the national space agency, showing that high-quality scientific exploration could be done at a fraction of the cost typically associated with such ambitious interplanetary missions in other countries.

154. (1) Statement I is correct but Statement II is incorrect
The successful arrival at the red planet placed the nation among a very small group of global agencies that have reached Mars. While the mission was originally designed to last for only six months, its performance was so good that it continued to operate and send data for many years. Suggestions that it failed early are completely false, as the spacecraft far outlived its expected lifespan, providing a wealth of information about the Martian atmosphere and surface features during its operation.

155. (4) Hohmann transfer orbit
To reach a distant planet with the limited fuel available, the spacecraft used a specific type of efficient path. This involves moving in an elliptical curve that touches the orbits of both the starting and destination planets. By timing the launch and the engine firings perfectly, the mission was able to use the sun's gravity to help it travel millions of kilometers. This classic maneuver is a standard in interplanetary travel but requires precise calculations to ensure a successful arrival.

156. (2) MCC : Optical imaging of Martian surface and moons
The spacecraft carried several instruments to study different aspects of the planet. One of the most important was a high-quality camera used to take pictures of the Martian surface and its two small moons. These images provided valuable information about the geology and features of the planet. Other instruments were designed to search for specific gases like methane or to study the upper atmosphere, helping scientists understand the history and current state of the environment on Mars in detail.

NODIA

157. (3) To physically return Martian soil samples to Earth
The primary goals of the mission were to test the technology for reaching Mars and to study the planet from orbit. This included imaging the surface and analyzing the atmosphere. However, it was never designed to land on the surface or collect and return any samples. Such a mission would be much more complex and expensive. Instead, this first attempt focused on demonstrating that the country could successfully navigate to and orbit another planet using entirely indigenous scientific and technical capabilities.

158. (4) Deuterium and Hydrogen
This specialized instrument was designed to study the very outer parts of the Martian atmosphere. By measuring the ratio of two specific types of atoms, scientists can learn about how the planet has lost its water over millions of years. This data is crucial for understanding the climate history of Mars and how it transformed from a potentially wet world into the dry desert we see today. It was one of several scientific experiments that provided new insights into planetary evolution.

159. (1) PSLV cost and GSLV reliability issues at that time
When the mission was being planned, the more powerful heavy-lift rocket was still undergoing testing and had experienced some difficulties. In contrast, the smaller polar launch vehicle had a long history of successful flights. Although it couldn't launch the spacecraft directly to Mars, scientists used a series of orbit-raising maneuvers to make it work. This choice was a strategic decision based on the proven reliability of the existing rocket and the need to keep the mission costs low.

160. (2) Deep space communication and navigation capability for India
The most important long-term benefit of the successful Mars mission was proving that the nation could manage complex operations at vast distances. This included tracking a

spacecraft millions of kilometers away and sending commands with high precision. It also required building a network of large antennas and developing sophisticated software for deep space navigation. These capabilities are now the foundation for all future missions to other planets and have placed the country firmly in the ranks of top spacefaring nations.

161. (1) I and II only
The country's first human spaceflight mission is designed to carry a crew into orbit for a short stay. It aims to showcase the ability to launch humans safely and keep them healthy in the environment of space. After completing their tasks, the crew will return to Earth by landing in the ocean using parachutes. Suggestions that the landing will happen in a desert are incorrect, as a water landing is the planned method for a safe and controlled recovery.

162. (1) A-iii, B-iv, C-i, D-ii
The mission uses several interconnected parts, each with a specific role. The section where the astronauts live and work is a habitable capsule. Attached to this is a unit that provides essential power and propulsion during the flight. Together, these form the complete module that stays in orbit. Additionally, there is a specialized system designed to quickly pull the crew to safety if something goes wrong during the launch. These components ensure the success and safety of the human spaceflight mission.

163. (1) II, IV, III, I
A typical mission starts with a powerful lift-off using a human-rated heavy rocket. Once in space, the spacecraft orbits the planet at a set altitude for several days. To return, the engines are fired to slow down and begin the descent back through the atmosphere. The final step involves a controlled landing in the water, where recovery teams are waiting. this sequence of launch, orbital stay, re-entry, and splashdown is the standard plan for the country's first manned space flight.

164. (4) HLVM3
The heavy-lift rocket normally used for large satellites has been specially modified to carry humans. These updates include improving its reliability and adding systems to monitor the health of the vehicle during flight. This human-rated version of the rocket is the most powerful in the national inventory and has been chosen because it can lift the heavy crew module into the required orbit. It represents a significant advancement in domestic rocket engineering and safety standards for crewed missions to space.

165. (3) A half-humanoid robot to simulate functions in test flights
Before humans are sent into space, the agency will launch a sophisticated robot designed to look like a person. This machine can perform several tasks inside the crew module and will be used to monitor how the conditions of flight affect a human-like occupant. It is equipped with sensors to collect data and can interact with the spacecraft's systems. This step is essential for testing all safety and environmental controls before the actual crewed mission takes place in the future.

166. (3) Both statements are correct
The individuals selected to be the first astronauts are highly experienced pilots from the air force. Because the country is developing its own training facilities, the initial phase of their preparation took place at a world-famous center in Russia. This provided them with the basic skills and knowledge needed for spaceflight. Following this international training, they have continued their specialized preparation domestically, focusing on the specific systems and procedures of the national mission. This combination ensures they are fully prepared.

167. (4) Crew Escape System performance under high dynamic pressure
A critical part of any manned mission is the ability to save the crew if the rocket fails during launch. To test this, a special flight was conducted using a simplified vehicle to see how the escape system works when the forces on the craft are at their highest. The successful test proved that the system could quickly and safely pull the capsule away from a malfunctioning rocket and deploy parachutes for a safe landing, providing essential safety for the future mission.

Click Here to Buy book on Amazon

168. (1) The ECLSS is entirely imported from NASA's surplus inventory
The systems required to keep humans alive in space, including providing air and managing temperature, are being developed indigenously. While there may be some international cooperation, the goal is to build these critical life-support technologies domestically. The mission is planned for a crew of up to three people and will involve a water landing after the LVM3 rocket is upgraded for safety. Suggestions that the entire life support system is just surplus equipment from another agency are completely false.

169. (3) Indian Navy
Because the crew module is designed to land in the ocean at the end of its mission, a specialized force is needed to find and retrieve it. This service branch has the necessary ships and aircraft to reach the splashdown site quickly and safely bring the astronauts and their capsule back to land. They have been working closely with the space agency to develop and test the procedures for a smooth and efficient recovery, ensuring the final phase of the mission is successful.

170. (1) Rakesh Sharma
While this individual was the first citizen of the country to travel into space many years ago on a Soviet mission, he is not part of the current group selected for the upcoming domestic program. The four pilots recently announced are the ones who will lead the first indigenous human spaceflight. The veteran astronaut serves as an inspiration and advisor to the new team, but he is not one of the active designates for the planned orbital mission, making him the exception.

171. (1) I and II only
The national satellite system is a major network that provides a wide range of communication services across the region. It is one of the largest and most successful of its kind, supporting everything from television broadcasting to weather forecasting. While it is used for some military tasks, it also provides essential services for civilians, such as rural education and disaster management. Statements describing its full name and its significant scale are correct, while claims that it is exclusively for military use are false.

172. (1) Both A and R are true and R is the correct explanation of A
Over time, the space agency began using a new name for its communication satellites to better reflect their technology and purpose. These newer models are designed for high-altitude orbits and provide much more capacity for digital services like the internet and advanced broadcasting. This shift in naming represents the transition to a more sophisticated generation of indigenous spacecraft. Both the change in convention and the reason for it are accurate parts of the history of the country's growing satellite communication capabilities.

173. (3) Geostationary Orbit
To provide continuous service to the entire country, these communication satellites are placed in a very high orbit where they appear to stay in the same position in the sky. This allows ground antennas to remain pointed at them without needing to move. This specific high-altitude path is ideal for television broadcasting and telecommunications, as it covers a vast area 24 hours a day. It is the standard location for most of the nation's strategic and commercial communication satellite networks and systems.

NODIA

174. (4) TV broadcasting and telecommunications
The introduction of a domestic satellite system completely changed how people received information across the country. It allowed for the nationwide expansion of television services and modernized the telephone network, especially in remote areas. This technological revolution made it possible to provide education and news to millions of people simultaneously, playing a fundamental role in national development. The success of this system proved the value of investing in space technology for the direct socio-economic benefit of the general public.

175. (1) Statement I is correct but Statement II is incorrect
This particular satellite was a major milestone as it was the first in the world entirely dedicated to educational services. It allowed for interactive classrooms and distance learning across the country. However, it was placed in a high-altitude orbit to provide wide coverage, not in a low orbit for mapping. Suggestions that it was used for campus imaging are false, as its primary purpose

was to deliver high-quality educational content via satellite links to thousands of remote schools and colleges.

176. (2) Transponders in C, Ku, and Ka bands
Communication satellites function by receiving signals from the ground, amplifying them, and then sending them back down to a wide area. This is done using specialized electronic devices that operate on different parts of the radio spectrum. Each frequency band is suited for different tasks, such as high-quality television or reliable data networks. This technology allows for the seamless transfer of information across the country, making the satellites an essential part of the modern national telecommunications and broadcasting infrastructure.

177. (2) High-resolution optical spy imagery
While these satellites provide many vital services like television broadcasting, internet access, and search and rescue support, they are not designed for high-resolution photography. Taking detailed pictures of the ground is the job of specialized Earth observation satellites that usually fly much closer to the planet. The high-altitude communication fleet is focused on relaying radio signals over vast areas, which is a fundamentally different task from using telescopes to capture detailed images of the surface for strategic intelligence or monitoring.

178. (1) GSAT-7 (Rukmini): Dedicated communication for the Indian Navy
The space agency has developed several satellites tailored to the needs of specific users. One of these provides secure and reliable communication links for the naval fleet across the entire Indian Ocean region. Other similar satellites have been launched for the air force or to provide services for neighboring countries. Correctly matching these spacecraft to their primary users highlights how space technology is used to meet the specific strategic and developmental requirements of different branches of the military and the government.

179. (3) Multiple spot beams for frequency reuse
This advanced type of satellite provides much more data capacity than older models by using a specialized design. Instead of one wide signal covering everything, it uses many smaller, focused beams. This allows the same radio frequencies to be used several times in different areas, significantly increasing the total amount of information the satellite can handle. This technology is essential for providing high-speed internet and other data-heavy services to a large number of users across the country simultaneously.

180. (4) Enabling Tele-medicine and expert consultation via VSAT
One of the most important uses of satellite technology is connecting remote areas with high-quality medical expertise. By providing reliable data links, these satellites allow doctors in rural clinics to consult with specialists in large cities. This helps in diagnosing and treating patients who might otherwise not have access to advanced care. This practical application of space science has a direct and positive impact on the health and well-being of people living in the most distant parts of the country.

181. (2) I, II, and IV only
This system is a locally developed navigation service that provides accurate positioning and timing information. It is designed to cover the entire country and a large area around its borders. While it provides essential data for both civilian and strategic users, the current group of satellites is much smaller than the dozens used by global systems. Statements about its name, purpose, and coverage area are correct, but the claim that it already has twenty-four satellites is not accurate.

182. (1) A-iv, B-iii, C-i, D-ii
Several major powers have built their own satellite networks to provide global or regional positioning data. The United States has the most well-known system, while Russia and the European Union have their own independent versions. The national system was developed specifically to ensure that accurate data is always available for this region without relying on foreign technology. This variety of systems shows how important satellite navigation has become for everything from personal smartphones to complex military and transportation infrastructure worldwide.

NODIA

183. (1) Standard Positioning Service (SPS) and Restricted Service (RS)
The navigation system provides two distinct levels of data. One is open to everyone and can be used by common devices like smartphones for everyday travel. The other is a highly secure and more accurate signal that is meant only for authorized government and military users. This dual-service approach ensures that the general public benefits from the technology while also providing the specialized and protected data needed for national security and other critical strategic and scientific applications.

184. (2) 7
The original design for the regional navigation system required a specific number of satellites to provide full and reliable coverage. This small group of seven spacecraft was placed in carefully chosen orbits to ensure they are always visible from any part of the country. This efficient configuration provides high accuracy for the intended area without the need for the dozens of satellites required by systems that aim for global coverage. It represents a major accomplishment in indigenous satellite network design and operation.

185. (1) Statement I is correct but Statement II is incorrect
The navigation system uses a mix of high-altitude orbits to keep the satellites in view of the region at all times. This includes some that stay in one spot and others that move in a figure-eight pattern. While some early components were imported, the long-term goal has been to develop these critical parts indigenously. Suggestions that the system relies entirely on foreign-made clocks are incorrect, as successful efforts have been made to produce and use locally built atomic clocks for the satellites.

186. (1) L5 and S bands
To provide accurate position information, the satellites broadcast their signals on two specific parts of the radio spectrum. Using two different bands helps in correcting errors caused by the atmosphere, leading to better accuracy. This choice of frequencies also ensures that the system can work well with modern receivers found in smartphones and other mobile devices. It is a standard technical feature that allows the navigation service to provide reliable data for both civilian and strategic users across the entire region.

187. (4) Both (1) and (2) are true negative events
The development of the navigation system faced some significant challenges. One early satellite experienced a failure of the critical clocks needed for its signals to work. Later, an attempt to launch a replacement was unsuccessful because a part of the rocket did not separate as it should have, leaving the satellite stuck inside. These setbacks were difficult but provided important lessons that were used to improve the reliability and success of future launches and satellite designs in the program.

188. (2) Space Segment : The 7 satellite constellation
The system is made up of several parts that work together to provide navigation data. The group of satellites flying high above the Earth is responsible for sending out the signals. There is also a network of ground stations that monitor and control the satellites, and a user part that includes all the devices that receive and use the data. Correctly identifying these sections is key to understanding how the entire indigenous positioning and timing network is organized and operated.

189. (3) 1999 Kargil War GPS data denial
The primary reason the country decided to build its own navigation system was a difficult lesson learned during a past conflict. When accurate position data was needed for military operations, access to the global system managed by another nation was restricted. This showed the danger of relying on foreign technology for national security. Since then, the focus has been on achieving independence in satellite navigation to ensure that reliable and secure data is always available, especially during times of crisis.

190. (4) Mangalyaan
Most of the listed names refer to satellite networks designed to provide positioning data on Earth. China, Japan, and Russia all have their own systems for this purpose. This particular name stands out because it belongs to a mission sent to another planet for scientific study. While it used sophisticated navigation to reach its target, it is an interplanetary orbiter, not a constellation

Downloaded from www.pdf.tube

used for day-to-day position finding on our home planet, making it the clear exception in this group.

191. (4) I, II, III, IV, and V
This first solar observatory carries a wide array of specialized instruments to study different aspects of the sun. Some are designed to take pictures of the sun's outer atmosphere, while others analyze the flow of particles and magnetic fields coming from it. Each tool has a specific job, such as measuring X-rays or studying the thin layer of plasma. Together, these seven major payloads provide a complete and detailed view of the sun's activity and its effects on space.

192. (1) L1
This mission is placed in a very special location in space where the gravity of the sun and the Earth balance out. This spot, located about 1.5 million kilometers away, allows the spacecraft to stay in a stable position while always having a clear view of the sun. This is ideal for a solar observatory, as it can monitor the sun 24 hours a day without any interruptions from the Earth or the moon, providing a continuous stream of data.

193. (2) PSLV-C57
For this historic mission to study the sun, the agency used its highly reliable and versatile four-stage rocket. The launch was successful, placing the spacecraft on the first part of its long journey to its final destination in space. This rocket has a long history of carrying important scientific and commercial payloads and was the perfect choice for this precise and ambitious task. Its performance on this mission once again proved its status as the mainstay of the national space program.

194. (3) Both statements are correct
The spacecraft is positioned in a unique path around a balance point in space, far away from Earth. This location is about 1.5 million kilometers from our planet. Because of this strategic position, the observatory can watch the sun continuously without ever being blocked by the Earth or experiencing an eclipse. These features are essential for a mission that aims to study the sun's dynamic behavior and its impact on the environment of the entire solar system.

NODIA

195. (3) The corona is vastly hotter than the photosphere
One of the biggest mysteries in solar science is why the sun's outer atmosphere is much hotter than its surface. Normally, temperature drops as you move away from a heat source, but the sun's corona behaves differently. The mission is carrying instruments to study this phenomenon and help scientists understand what causes this intense heating. Solving this puzzle is important for knowing how energy is moved from the sun's interior into space and how it affects the space weather around Earth.

196. (4) VELC : Studying the solar corona and CMEs
Each instrument on the solar observatory has a specific target. One major tool is designed to study the sun's outer atmosphere and the massive bursts of energy and particles that it sometimes releases. These events can have a significant impact on technology on Earth. By monitoring them closely, the mission provides valuable data for predicting and understanding space weather. Correctly matching these payloads to their tasks shows how the mission uses multiple approaches to get a complete picture of the sun.

197. (4) Solar Core
While the observatory can use advanced cameras and sensors to study the different outer layers of the sun, it cannot see into the very center. The middle of the sun is hidden behind thousands of kilometers of dense material, making it impossible to observe directly with light or other signals. Scientists study the core using other methods like computer models or specialized particle detectors on Earth. The mission is focused on the parts of the sun that can be seen from space.

198. (2) Two-body gravity balances centrifugal force
These are unique spots in space between two large objects, like the sun and the Earth, where a smaller object can stay in a fixed position. At these points, the pull of gravity from both large bodies perfectly balances the force of the small object's motion. This creates a stable location that is perfect for placing satellites or observatories that need to stay in one place relative to the planets or the sun, allowing for long-term and continuous observation.

199. (4) Solar weather disrupting satellites and grids
Massive explosions of energy from the sun can send powerful clouds of particles toward our planet. When these clouds arrive, they can interfere with the electronics on satellites and even cause problems for power lines on the ground. By monitoring these events, the solar observatory helps provide warnings so that companies can protect their equipment. This is a very practical benefit of the mission, as it helps to keep our global communication and energy systems safe from the sun's activity.

200. (1) Operational deep space solar observatories
The successful launch and operation of this mission represent a major milestone, as it is the country's first dedicated space observatory for the sun. It places the nation in a small group of spacefaring powers with the ability to conduct long-term solar research from deep space. The data collected will improve our understanding of the sun and help protect our technology from solar storms. This mission is a clear sign of the growing maturity and ambition of the national space program.

www.nodia.in

Click Here to Buy book on Amazon

CHAPTER 04

Genetics, Biotechnology & Nanotechnology

NODIA

1. Which of the following nitrogenous bases is a purine found in the DNA double helix?
(1) Cytosine
(2) Adenine
(3) Thymine
(4) Uracil
(5) Question not attempted

2. In the Watson-Crick model of DNA, how many hydrogen bonds pair Adenine with Thymine?
(1) One
(2) Two
(3) Three
(4) Four
(5) Question not attempted

3. What is the fundamental structural unit of a DNA molecule?
(1) Nucleoside
(2) Amino acid
(3) Nucleotide
(4) Fatty acid
(5) Question not attempted

4. Consider the following statements regarding the DNA double helix:
I. The two strands run in an antiparallel direction.
II. The backbone is constituted by sugar-phosphate.
III. The pitch of the helix is 3.4 nanometers.
Which of the above statements are correct?
(1) I and II only
(2) II and III only
(3) I and III only
(4) I, II and III
(5) Question not attempted

5. Given below are two statements, one labeled as Assertion (A) and the other as Reason (R):
Assertion (A): The two strands of DNA can be separated by heating.
Reason (R): The strands of DNA are held together by weak hydrogen bonds between the nitrogenous bases.
Select the correct answer from the codes given below:
(1) Both A and R are true and R is the correct explanation of A.
(2) Both A and R are true but R is not the correct explanation of A.
(3) A is true but R is false.
(4) A is false but R is true.
(5) Question not attempted

6. Which among the following is not a function of DNA?
(1) Storage of genetic information
(2) Direct synthesis of lipids in the cytoplasm
(3) Replication during cell division
(4) Controlling cellular activities through transcription
(5) Question not attempted

7. The distance between two consecutive base pairs in a standard B-DNA double helix is approximately:
(1) 0.34 nm
(2) 3.4 nm
(3) 20 nm
(4) 34 nm
(5) Question not attempted

8. Which of the following rules states that the amount of adenine equals the amount of thymine, and the amount of guanine equals cytosine in DNA?
(1) Chargaffs Rule
(2) Mendels Rule
(3) Griffiths Rule
(4) Franklin-Wilkins Rule
(5) Question not attempted

9. Identify the incorrect statement regarding the structure of DNA.
(1) It contains a pentose sugar called deoxyribose.
(2) The guanine-cytosine base pair is held by

29. If a pea plant with round seeds (RR) is crossed with a plant with wrinkled seeds (rr), what will be the genotype of the F1 generation?
(1) RR
(2) Rr
(3) rr
(4) A mix of RR, Rr, and rr
(5) Question not attempted

30. Which trait among the following was not studied by Gregor Mendel in pea plants?
(1) Flower color
(2) Seed shape
(3) Pod color
(4) Root length
(5) Question not attempted

31. Chromosomes that are not involved in sex determination are called:
(1) Autosomes
(2) Allosomes
(3) Ribosomes
(4) Centrosomes
(5) Question not attempted

32. In the normal human karyotype, how many pairs of autosomes are present?
(1) 22 pairs
(2) 23 pairs
(3) 44 pairs
(4) 46 pairs
(5) Question not attempted

33. The highly condensed and transcriptionally inactive region of a chromosome is called:
(1) Euchromatin
(2) Heterochromatin
(3) Telomere
(4) Centromere
(5) Question not attempted

34. Match List-I with List-II regarding chromosome types:
List I: (Chromosome type)
A. Metacentric
B. Sub-metacentric
C. Acrocentric
D. Telocentric
List II: (Centromere position)
i. Centromere at the terminal end
ii. Centromere in the middle, equal arms
iii. Centromere close to the end
iv. Centromere slightly away from the middle
(1) A-ii, B-iv, C-iii, D-i
(2) A-ii, B-i, C-iv, D-iii
(3) A-i, B-ii, C-iii, D-iv
(4) A-iv, B-iii, C-ii, D-i
(5) Question not attempted

35. Consider the following statements about human chromosomes:
I. The Y chromosome is smaller than the X chromosome.
II. Telomeres protect the ends of chromosomes from deterioration.
III. Kinetochores form at the centromere during cell division.
IV. A normal human female karyotype is 46, XY.
V. Histone proteins help package DNA into chromosomes.
Which of the above statements is incorrect?
(1) I and II only
(2) IV only
(3) III and V only
(4) II, IV and V only
(5) Question not attempted

36. What is the primary function of telomeres?
(1) Separation of sister chromatids during the mitotic phase
(2) Recruitment of transcriptional machinery to the promoter
(3) Physical binding of members within a homologous DNA pair
(4) Maintenance of genomic stability during DNA replication
(5) Question not attempted

37. Which of the following chromosomal arrangements represents the karyotype of a normal human male?
(1) 44 Autosomes + XX
(2) 44 Autosomes + XY
(3) 22 Autosomes + XY
(4) 46 Autosomes + XY
(5) Question not attempted

38. The proteinaceous structure on the centromere to which spindle fibers attach during cell division is the:
(1) Kinetochore

Downloaded from www.pdf.tube

STUDYING FROM PDFs?

THINK AGAIN.

If you are studying only from PDFs,
you are wasting valuable time.

Research shows that learning from

PRINTED BOOKS has up to

4× HIGHER RETENTION

than studying from screens.

PRINT BOOK = BETTER MEMORY

PDF = LOWER RETENTION

Those who study from **PRINTED BOOKS**
move **AHEAD.**

Others are left **BEHIND**
in competition.

In competitive exams,
being average is not enough.

STAY ONE STEP AHEAD.

19. Identify the correct pair:
(1) Genotype - Observable traits of an organism
(2) Phenotype - Genetic makeup of an organism
(3) Homozygous - Two identical alleles at a locus
(4) Heterozygous - Identical alleles on homologous chromosomes
(5) Question not attempted

20. Which cellular organelle is directly involved in the translation phase of gene expression?
(1) Lysosome
(2) Golgi apparatus
(3) Smooth Endoplasmic Reticulum
(4) Ribosome
(5) Question not attempted

21. Mendels Law of Segregation states that:
(1) Genes for different traits sort into progeny independently
(2) One allele in a pair completely hides its partners effect
(3) Alleles separate into gametes and unite at fertilization
(4) Mutation provides the primary engine for genetic variation
(5) Question not attempted

22. What is the phenotypic ratio in the F2 generation of a standard Mendelian monohybrid cross?
(1) 1:2:1
(2) 9:3:3:1
(3) 3:1
(4) 2:1
(5) Question not attempted

23. Consider the following statements about Mendels laws:
I. The law of independent assortment applies to genes located on the same chromosome that are tightly linked.
II. A dihybrid cross involves studying two traits simultaneously.
III. The law of segregation is universally applicable with no exceptions in diploid organisms.
IV. Mendels experiments used Pisum sativum.
Which of the above statement(s) is/are correct?
(1) I, II and IV only
(2) II, III and IV only
(3) I, III and IV only
(4) I, II, III and IV
(5) Question not attempted

24. A test cross is performed to determine:
(1) Genotype of an individual showing a dominant phenotype
(2) Linkage relationship between two genes on a chromosome
(3) Frequency of spontaneous mutations within a population
(4) Physical location of a specific gene on the chromosome
(5) Question not attempted

25. Which of the following is the cause of the 9:3:3:1 ratio in a dihybrid cross?
(1) Law of Segregation
(2) Law of Dominance
(3) Law of Independent Assortment
(4) Incomplete Dominance
(5) Question not attempted

26. Mendels laws may not apply strictly in which of the following situations?
(1) Linked genes on the same chromosome
(2) Genes located on different chromosomes
(3) Traits governed by single genes with complete dominance
(4) Traits that sort independently
(5) Question not attempted

27. Identify the incorrect statement regarding Mendelian genetics.
(1) Recessive traits are only visible in homozygous genotypes
(2) Each individual gamete carries one allele for every trait
(3) Assortment of genetic material occurs during the meiosis
(4) F1 progeny of true-breeding parents show mixed phenotypes
(5) Question not attempted

28. Which of the following best explains the term alleles in Mendelian genetics?
(1) Multiple genes controlling a single trait
(2) Alternative forms of a single gene
(3) The physical location of genes on a chromosome
(4) Proteins synthesized by genes
(5) Question not attempted

NODIA

three hydrogen bonds.
(3) Uracil replaces thymine in the complementary strand.
(4) The diameter of the B-DNA helix is 20 Angstroms.
(5) Question not attempted

10. The process by which DNA makes a copy of itself is known as:
(1) Replication
(2) Transcription
(3) Translation
(4) Transduction
(5) Question not attempted

11. A gene is best defined as:
(1) The entire collection of chromosomal material within a cell
(2) The physical observable characteristic of a living organism
(3) The complete set of proteins expressed by the genome at once
(4) A specific DNA segment encoding a functional protein or RNA
(5) Question not attempted

12. The specific physical location of a gene on a chromosome is called its:
(1) Allele
(2) Locus
(3) Genome
(4) Chromatid
(5) Question not attempted

13. Consider the following steps of gene expression:
A. mRNA leaves the nucleus
B. RNA polymerase transcribes DNA into mRNA
C. Ribosome translates mRNA into a polypeptide chain
D. Protein folding and modification
Which of the following represents the correct sequence?
(1) B, A, C, D
(2) A, B, C, D
(3) B, C, A, D
(4) C, B, A, D
(5) Question not attempted

14. Match List-I with List-II regarding gene components:
List I: (Gene component)
A. Promoter
B. Exon
C. Intron
D. Terminator
List II: (Description)
i. Non-coding region of a gene
ii. Region marking the end of transcription
iii. Coding region of a gene
iv. Binding site for RNA polymerase
(1) A-iv, B-iii, C-i, D-ii
(2) A-iv, B-i, C-iii, D-ii
(3) A-ii, B-iii, C-i, D-iv
(4) A-iii, B-iv, C-ii, D-i
(5) Question not attempted

15. The Central Dogma of molecular biology explains the flow of genetic information as:
(1) DNA to RNA to Protein
(2) RNA to DNA to Protein
(3) Protein to RNA to DNA
(4) DNA to Protein to RNA
(5) Question not attempted

16. The variations of a particular gene are known as:
(1) Introns
(2) Alleles
(3) Histones
(4) Operons
(5) Question not attempted

17. Which of the following best describes an operon in bacterial gene expression?
(1) Sequence that produces several unrelated proteins at once
(2) Group of genes transcribed together from a single promoter
(3) Regulatory DNA sequence that prevents polymerase movement
(4) Specialized enzyme that degrades mRNA strands in the cell
(5) Question not attempted

18. The expression of a gene primarily results in the synthesis of:
(1) Polypeptides
(2) Carbohydrates
(3) Lipids
(4) Phospholipids
(5) Question not attempted

Click Here to Buy book on Amazon

(2) Centrosome
(3) Chromomere
(4) Nucleosome
(5) Question not attempted

39. Which of the following represents the odd one out regarding chromosome structural components?
(1) Centromere
(2) Chromatid
(3) Plasmid
(4) Telomere
(5) Question not attempted

40. The basic unit of DNA packaging in eukaryotes, consisting of a segment of DNA wound around histone protein cores, is known as a:
(1) Ribosome
(2) Nucleolus
(3) Prion
(4) Nucleosome
(5) Question not attempted

41. A mutation that involves the substitution of a single base pair in the DNA sequence is known as a:
(1) Frameshift mutation
(2) Deletion mutation
(3) Point mutation
(4) Chromosomal inversion
(5) Question not attempted

42. Given below are two statements, one labeled as Assertion (A) and the other as Reason (R):
Assertion (A): Frameshift mutations generally have a more severe effect on protein function than point mutations.
Reason (R): Frameshift mutations alter the entire reading frame of the mRNA downstream of the mutation site.
Select the correct answer from the codes given below:
(1) Both A and R are true and R is the correct explanation of A.
(2) Both A and R are true but R is not the correct explanation of A.
(3) A is true but R is false.
(4) A is false but R is true.
(5) Question not attempted

43. Which of the following is an example of a physical mutagen?
(1) Ultraviolet (UV) radiation
(2) Nitrous acid
(3) Ethidium bromide
(4) Mustard gas
(5) Question not attempted

44. Consider the following statements regarding mutations:
I. Germline mutations can be inherited by the offspring.
II. Somatic mutations are passed down to future generations.
III. Silent mutations do not change the amino acid sequence of the protein.
Which of the above statement(s) is/are correct?
(1) I and II only
(2) II and III only
(3) I and III only
(4) I, II and III
(5) Question not attempted

45. A mutation resulting in the conversion of a regular codon into a stop codon is termed:
(1) Missense mutation
(2) Silent mutation
(3) Nonsense mutation
(4) Reverse mutation
(5) Question not attempted

46. The structural change in a chromosome where a segment breaks off and reattaches in the reverse direction is called:
(1) Duplication
(2) Inversion
(3) Deletion
(4) Translocation
(5) Question not attempted

47. Which of the following is most appropriate regarding induced mutations?
(1) Mutations arising during semi-conservative DNA replication
(2) Genetic changes occurring exclusively in certain plant types
(3) Heritable changes that consistently provide adaptive benefit
(4) Mutations resulting from exposure to external chemical agents
(5) Question not attempted

Downloaded from www.pdf.tube

(5) Question not attempted

66. In recombinant DNA technology, the term transformation refers to:
(1) The cutting of DNA by restriction enzymes.
(2) The introduction of recombinant DNA into a host cell.
(3) The joining of two DNA fragments by ligase.
(4) The extraction of DNA from a donor cell.
(5) Question not attempted

67. Which of the following best describes a chimeric DNA?
(1) Genetic material identified within mythic mosaic organisms
(2) Organellar DNA found in mitochondria of eukaryotic cells
(3) Sequence of human nucleotides containing random mutations
(4) Recombinant DNA formed from material of different species
(5) Question not attempted

68. The primary goal of inserting a gene into a host organism during genetic engineering is to:
(1) Production of gene copies or the encoded protein product
(2) Systematic destruction of the biological host cell unit
(3) Elevation of the genomic mutation frequency in the host
(4) Enzymatic breakdown of the native chromosomal material
(5) Question not attempted

69. Identify the incorrect statement regarding the tools of genetic engineering.
(1) Restriction enzymes cut DNA at specific recognition sites.
(2) Ligase acts as molecular glue to join DNA fragments.
(3) RNA polymerase is the primary enzyme used to synthesize cDNA from mRNA.
(4) Plasmids act as vectors to transfer genetic material.
(5) Question not attempted

70. What role does calcium chloride play in the transformation process of bacteria in genetic engineering?
(1) Facilitation of DNA entry by enhancing cell competence
(2) Provision of nutrients for accelerated bacterial growth
(3) Enzymatic digestion of the protective outer bacterial wall
(4) Inhibition of the enzymes that degrade recombinant DNA
(5) Question not attempted

71. Restriction endonucleases are enzymes that:
(1) Production of DNA using a single-stranded RNA template
(2) Covalent bonding of two distinct fragments of DNA helix
(3) Progressive degradation of nucleic acids from the ends
(4) Cleavage of DNA at specific internal recognition sites
(5) Question not attempted

NODIA

72. Match List-I with List-II regarding enzyme functions in biotechnology:
List I: (Enzyme)
A. Restriction Endonuclease
B. DNA Ligase
C. DNA Polymerase
D. Reverse Transcriptase
List II: (Function)
i. Forms phosphodiester bonds to join DNA fragments
ii. Cleaves DNA at specific palindromic sequences
iii. Synthesizes complementary DNA from an RNA template
iv. Synthesizes new DNA strands by adding nucleotides
(1) A-ii, B-i, C-iv, D-iii
(2) A-i, B-ii, C-iii, D-iv
(3) A-ii, B-iii, C-i, D-iv
(4) A-iv, B-i, C-ii, D-iii
(5) Question not attempted

73. Consider the following statements about restriction enzymes and DNA ligase:
I. Restriction enzymes are naturally found in bacteria as a defense mechanism against viruses.
II. EcoRI cuts DNA to produce blunt ends.
III. DNA ligase requires ATP to join DNA fragments.
IV. Palindromic nucleotide sequences read the

(3) Affected individuals usually exhibit a broad flat face and a prominent tongue.
(4) The total number of chromosomes in an affected somatic cell is 47.
(5) Question not attempted

57. Identify the correct pair regarding human genetic disorders:
(1) Turners syndrome - Trisomy 18
(2) Sickle cell anaemia - X-linked dominant
(3) Klinefelters syndrome - 47, XXY
(4) Haemophilia - Trisomy 13
(5) Question not attempted

58. Individuals heterozygous for the sickle cell trait have a survival advantage against which infectious disease?
(1) Tuberculosis
(2) Malaria
(3) Cholera
(4) Typhoid
(5) Question not attempted

59. The failure of homologous chromosomes or sister chromatids to separate properly during cell division, leading to conditions like Down syndrome, is called:
(1) Recombination
(2) Translocation
(3) Nondisjunction
(4) Crossing over
(5) Question not attempted

60. A woman who is a carrier for haemophilia marries a normal man. What is the probability that their son will have haemophilia?
(1) 0%
(2) 25%
(3) 100%
(4) 50%
(5) Question not attempted

61. Genetic engineering primarily involves the manipulation of:
(1) Proteins
(2) Lipids
(3) Deoxyribonucleic acid (DNA)
(4) Carbohydrates
(5) Question not attempted

62. Consider the following statements about recombinant DNA (rDNA) technology:
I. It involves cutting DNA from two different sources and joining them together.
II. A host organism, typically a bacterium, is used to multiply the recombinant DNA.
III. It completely avoids the use of vectors.
IV. Stanley Cohen and Herbert Boyer produced the first recombinant DNA molecule.
Which of the above statement(s) is/are correct?
(1) I, II and III
(2) I, II and IV
(3) II, III and IV
(4) I, III and IV
(5) Question not attempted

63. Consider the following statements regarding genetic engineering:
Statement I: Genetic engineering allows for the transfer of genes across different biological species.
Statement II: Natural sexual reproduction strictly restricts gene transfer to members of the same or closely related species.
Which of the following represents the correct option?
(1) Both Statement I and Statement II are correct.
(2) Both Statement I and Statement II are incorrect.
(3) Statement I is correct but Statement II is incorrect.
(4) Statement I is incorrect but Statement II is correct.
(5) Question not attempted

64. The first recombinant DNA molecule was created by linking an antibiotic resistance gene to a native plasmid of which bacterium?
(1) Salmonella typhimurium
(2) Escherichia coli
(3) Bacillus thuringiensis
(4) Agrobacterium tumefaciens
(5) Question not attempted

65. The technique used to separate DNA fragments according to their size in genetic engineering is:
(1) Polymerase Chain Reaction
(2) Centrifugation
(3) Gel electrophoresis
(4) Spectrophotometry

Click Here to Buy book on Amazon

48. Identify the incorrect statement regarding mutations.
(1) Most random mutations are beneficial to the organism.
(2) Mutations are the ultimate source of all genetic variation.
(3) Mutations can occur spontaneously without external influence.
(4) A mutation in a somatic cell usually affects only the individual organism.
(5) Question not attempted

49. The exchange of chromosomal segments between non-homologous chromosomes is referred to as:
(1) Crossing over
(2) Inversion
(3) Translocation
(4) Nondisjunction
(5) Question not attempted

50. What is the effect of a missense mutation?
(1) Single amino acid substitution within the protein sequence
(2) Introduction of an early termination signal in transcript
(3) Modification of triplet sequence across the entire gene
(4) Preservation of protein structure despite the DNA change
(5) Question not attempted

51. Down syndrome is a genetic disorder caused by the presence of an extra copy of which chromosome?
(1) Chromosome 13
(2) Chromosome 18
(3) X Chromosome
(4) Chromosome 21
(5) Question not attempted

52. Match List-I with List-II regarding genetic disorders:
List I: (Genetic Disorder)
A. Sickle cell anaemia
B. Haemophilia
C. Down syndrome
D. Turners syndrome
List II: (Cause/Characteristic)
i. X-linked recessive disorder preventing blood clotting
ii. Point mutation in the beta-globin chain
iii. Absence of one X chromosome in females (45, X0)
iv. Trisomy 21
(1) A-ii, B-i, C-iv, D-iii
(2) A-i, B-ii, C-iii, D-iv
(3) A-ii, B-iv, C-i, D-iii
(4) A-iv, B-i, C-ii, D-iii
(5) Question not attempted

53. Sickle cell anaemia is characterized by the substitution of glutamic acid by which amino acid in the beta-globin chain of haemoglobin?
(1) Leucine
(2) Glycine
(3) Valine
(4) Proline
(5) Question not attempted

54. Which of the following represents the correct sequence of events leading to sickle cell anaemia?
(1) Point mutation in DNA - Altered mRNA - Altered amino acid sequence - Polymerization of haemoglobin under low oxygen - RBC shape changes
(2) Point mutation in DNA - Polymerization of haemoglobin under low oxygen - Altered mRNA - Altered amino acid sequence - RBC shape changes
(3) Altered mRNA - Point mutation in DNA - Altered amino acid sequence - RBC shape changes - Polymerization of haemoglobin
(4) RBC shape changes - Point mutation in DNA - Altered mRNA - Altered amino acid sequence - Polymerization of haemoglobin
(5) Question not attempted

55. Haemophilia is often referred to as the Royal Disease. It is genetically transmitted as an:
(1) X-linked recessive trait
(2) Autosomal dominant trait
(3) Autosomal recessive trait
(4) Y-linked trait
(5) Question not attempted

56. Which of the following statements about Down syndrome is incorrect?
(1) It is caused by non-disjunction of chromosomes during meiosis.
(2) It only affects male children.

NODIA

same on both strands when read in the same direction (e.g., 5' to 3').
V. DNA ligase cannot join blunt-ended DNA fragments.

Which of the above statements are correct?
(1) I, II and V
(2) I, III and IV
(3) II, III and V
(4) I, IV and V
(5) Question not attempted

74. EcoRI is a widely used restriction enzyme. In its naming convention, what does the co stand for?
(1) Cobalt
(2) Coli
(3) Coenzyme
(4) Colony
(5) Question not attempted

75. The specific sequences recognized by restriction endonucleases are typically:
(1) Tandem repeats
(2) Homopolymeric tails
(3) Palindromic sequences
(4) Telomeric sequences
(5) Question not attempted

76. DNA ligase joins two DNA fragments by catalyzing the formation of which type of bond?
(1) Hydrogen bond
(2) Glycosidic bond
(3) Peptide bond
(4) Phosphodiester bond
(5) Question not attempted

77. Which of the following is an exception to the rule that restriction endonucleases produce sticky ends?
(1) EcoRI
(2) BamHI
(3) SmaI
(4) HindIII
(5) Question not attempted

78. Overhanging, single-stranded ends of DNA created by certain restriction enzymes are called:
(1) Blunt ends
(2) Sticky ends
(3) Capped ends
(4) Tailed ends
(5) Question not attempted

79. Identify the incorrect statement regarding DNA ligase.
(1) It is used in both DNA replication and recombinant DNA technology.
(2) It joins Okazaki fragments during DNA replication.
(3) T4 DNA ligase is commonly used in genetic engineering.
(4) It can synthesize DNA de novo without a template.
(5) Question not attempted

80. The biological role of restriction endonucleases in bacteria is to:
(1) Digestion of invading viral DNA to prevent cell infection
(2) Facilitation of diverse modes of bacterial reproduction
(3) Primary enzymatic synthesis of bacterial chromosomal DNA
(4) Coordination of horizontal transfer through conjugation
(5) Question not attempted

81. The Polymerase Chain Reaction (PCR) technique was developed by:
(1) James Watson
(2) Frederick Sanger
(3) Kary Mullis
(4) Alec Jeffreys
(5) Question not attempted

82. Consider the following steps of the Polymerase Chain Reaction (PCR):
A. Extension
B. Denaturation
C. Annealing

Which of the following represents the correct sequence?
(1) B, C, A
(2) A, B, C
(3) C, B, A
(4) B, A, C
(5) Question not attempted

83. Given below are two statements, one labeled as Assertion (A) and the other as Reason (R):
Assertion (A): Taq polymerase is extensively used in the PCR process.
Reason (R): Taq polymerase is a thermostable enzyme that remains active during the high-

Downloaded from www.pdf.tube

temperature denaturation step.
Select the correct answer from the codes given below:
(1) Both A and R are true and R is the correct explanation of A.
(2) Both A and R are true but R is not the correct explanation of A.
(3) A is true but R is false.
(4) A is false but R is true.
(5) Question not attempted

84. The bacterium from which Taq polymerase is isolated is:
(1) Thermus aquaticus
(2) Escherichia coli
(3) Bacillus subtilis
(4) Agrobacterium tumefaciens
(5) Question not attempted

85. During the denaturation step of PCR, the temperature is typically raised to approximately:
(1) 50-60 C
(2) 72 C
(3) 94-96 C
(4) 120 C
(5) Question not attempted

86. What is the primary purpose of the short oligonucleotide primers used in PCR?
(1) Cleavage of the target DNA at specific molecular sites
(2) Provision of a starting point for the polymerase enzyme
(3) Permanent stabilization of the double helix during PCR
(4) Targeted enzymatic degradation of template DNA material
(5) Question not attempted

87. After 30 cycles of a standard PCR, approximately how many copies of the target DNA are produced from a single double-stranded DNA molecule?
(1) 30 copies
(2) 60 copies
(3) 1,000 copies
(4) Over 1 billion copies
(5) Question not attempted

88. Which of the following is not a standard application of PCR?
(1) Large-scale protein synthesis within the amplification
(2) Genetic profiling and forensic identification of people
(3) Clinical detection of viral pathogens in medical samples
(4) Amplification of degraded DNA fragments from fossils
(5) Question not attempted

89. Identify the incorrect statement regarding the annealing step in PCR.
(1) It occurs at a lower temperature than denaturation.
(2) It allows primers to bind to the complementary target sequences.
(3) It requires the presence of DNA ligase.
(4) The typical temperature range for this step is 50-65 C.
(5) Question not attempted

90. A thermocycler is an instrument used primarily for:
(1) Automating the temperature changes required for PCR
(2) Sequencing human genomes
(3) Measuring the molecular weight of DNA
(4) Splicing mRNA
(5) Question not attempted

NODIA

91. Extra-chromosomal, self-replicating, circular, double-stranded DNA molecules found naturally in many bacteria are called:
(1) Nucleoids
(2) Prions
(3) Transposons
(4) Plasmids
(5) Question not attempted

92. Match List-I with List-II regarding cloning vector components:
List I: (Vector Component)
A. Origin of replication (ori)
B. Selectable marker
C. Multiple cloning site (MCS)
D. Promoter
List II: (Function)
i. Region containing several restriction sites for gene insertion
ii. Sequence where DNA replication begins
iii. Gene that helps identify transformed cells (e.g., antibiotic resistance)

iv. Sequence needed to initiate transcription of the inserted gene
(1) A-ii, B-iii, C-i, D-iv
(2) A-i, B-ii, C-iv, D-iii
(3) A-ii, B-i, C-iii, D-iv
(4) A-iv, B-iii, C-ii, D-i
(5) Question not attempted

93. Consider the following statements about gene cloning vectors:
I. pBR322 is a widely used, artificially synthesized plasmid vector.
II. Plasmids can accommodate infinitely large fragments of foreign DNA.
III. Selectable markers allow the differentiation between recombinants and non-recombinants.
Which of the above statement(s) is/are correct?
(1) I and II only
(2) II and III only
(3) I and III only
(4) I, II and III
(5) Question not attempted

94. The ampicillin resistance gene in plasmid pBR322 acts as a:
(1) Selectable marker
(2) Promoter
(3) Restriction enzyme
(4) Origin of replication
(5) Question not attempted

95. The phenomenon where the insertion of a foreign gene within the coding sequence of an enzyme gene leads to the loss of that enzymes activity is known as:
(1) Transformation
(2) Transduction
(3) Insertional inactivation
(4) Recombination
(5) Question not attempted

96. Which of the following vectors is most commonly used to transfer genes into dicot plants?
(1) Retrovirus
(2) Ti plasmid of Agrobacterium tumefaciens
(3) Bacteriophage lambda
(4) YAC (Yeast Artificial Chromosome)
(5) Question not attempted

97. The process of introducing recombinant vectors into animal cells is often achieved through:
(1) Heat shock using magnesium chloride
(2) Standard bacterial conjugation
(3) Simple diffusion across the cell membrane
(4) Electroporation or microinjection
(5) Question not attempted

98. Identify the incorrect statement regarding cloning vectors.
(1) Bacteriophages cannot be used as cloning vectors.
(2) A high copy number is desirable for maximizing the yield of the cloned gene.
(3) YACs and BACs are used for cloning very large DNA fragments.
(4) Expression vectors contain regulatory sequences like promoters and ribosome binding sites.
(5) Question not attempted

99. Why is a single recognition site for a given restriction enzyme preferred in a cloning vector?
(1) Drastic acceleration of plasmid replication in the host
(2) Enhanced survival of the plasmid at high temperatures
(3) Prevention of vector fragmentation during cloning steps
(4) Increased statistical probability of successful insertion
(5) Question not attempted

100. The primary purpose of gene cloning in biotechnology is to:
(1) Create multiple exact copies of a specific DNA segment
(2) Eliminate genetic defects in the donor organism
(3) Destroy pathogenic bacteria
(4) Randomly mutate genes for evolutionary studies
(5) Question not attempted

101. Transgenic organisms are best defined as organisms that:
(1) Organisms that have lost their entire original genome
(2) Species that have naturally mutated over generations
(3) Progeny generated through controlled

Click Here to Buy book on Amazon

(5) Question not attempted

119. Identify the incorrect statement regarding human genome characteristics.
(1) Chromosome 1 has the most genes.
(2) The Y chromosome has the fewest genes.
(3) Over 50% of the discovered genes have known, specific functions.
(4) Over 99.9% of the nucleotide bases are exactly the same in all people.
(5) Question not attempted

120. Repeated sequences make up a large portion of the human genome. What is their primary role?
(1) Direct encoding of essential metabolic protein molecules
(2) Synthesis of specialized ribosomal RNA cell components
(3) Identification of sites for various restriction enzymes
(4) Contribution to understanding the chromosome structure
(5) Question not attempted

121. CRISPR-Cas9 is a revolutionary technology primarily used for:
(1) Sequencing entire genomes rapidly
(2) Amplifying DNA fragments
(3) Targeted and precise gene editing
(4) Cloning whole organisms
(5) Question not attempted

122. Match List-I with List-II regarding CRISPR components:
List I: (CRISPR component)
A. Cas9
B. guide RNA (gRNA)
C. PAM sequence
D. Target DNA
List II: (Function)
i. Directs the Cas9 enzyme to the precise location on the genome
ii. The sequence to be edited or cut
iii. An endonuclease enzyme acting as molecular scissors
iv. A short DNA sequence adjacent to the target that Cas9 recognizes to bind
(1) A-iii, B-i, C-iv, D-ii
(2) A-i, B-iii, C-ii, D-iv
(3) A-iii, B-iv, C-i, D-ii
(4) A-iv, B-i, C-iii, D-ii
(5) Question not attempted

123. Given below are two statements, one labeled as Assertion (A) and the other as Reason (R):
Assertion (A): CRISPR-Cas9 was originally discovered as an adaptive immune system in bacteria.
Reason (R): Bacteria use CRISPR-Cas9 to remember and cut the DNA of invading viruses (bacteriophages).
Select the correct answer from the codes given below:
(1) Both A and R are true and R is the correct explanation of A.
(2) Both A and R are true but R is not the correct explanation of A.
(3) A is true but R is false.
(4) A is false but R is true.
(5) Question not attempted

NODIA

124. Who among the following were awarded the Nobel Prize in Chemistry in 2020 for the development of the CRISPR-Cas9 method for genome editing?
(1) Emmanuelle Charpentier and Jennifer Doudna
(2) James Watson and Francis Crick
(3) Kary Mullis and Frederick Sanger
(4) Craig Venter and Francis Collins
(5) Question not attempted

125. In the acronym CRISPR, what does the R stand for?
(1) Recombinant
(2) Random
(3) Ribosome
(4) Repeats
(5) Question not attempted

126. A major potential application of CRISPR-Cas9 technology in human medicine is:
(1) Replacing traditional antibiotics with DNA
(2) Curing genetic diseases by correcting mutations
(3) Permanently stopping the aging process
(4) Enhancing human vision to see ultraviolet light naturally
(5) Question not attempted

127. Identify the incorrect statement regarding CRISPR-Cas9.

110. Which of the following crops was the first transgenic crop introduced for commercial cultivation in the world?
(1) Flavr Savr Tomato
(2) Bt Cotton
(3) Golden Rice
(4) RoundUp Ready Soybeans
(5) Question not attempted

111. The Human Genome Project (HGP) was officially launched in which year?
(1) 1980
(2) 1990
(3) 2000
(4) 2003
(5) Question not attempted

112. Consider the following statements about the Human Genome Project:
I. It aimed to sequence the entire 3 billion base pairs of human DNA.
II. It discovered that humans have around 20,000 - 25,000 genes.
III. Less than 2% of the genome codes for proteins.
IV. It was an international, publicly funded mega-project.
V. It helped establish the field of bioinformatics.
Which of the above statement(s) is/are correct?
(1) I, II, III and V
(2) I, III, IV and V
(3) II, III, IV and V
(4) I, II, III, IV and V
(5) Question not attempted

113. Consider the following steps involved in sequencing a genome (Whole Genome Shotgun approach):
I. Isolation of DNA
II. Fragmentation
III. Cloning into vectors
IV. Sequencing
V. Computer-based assembly
Which of the following represents the correct sequence?
(1) Isolation of DNA - Fragmentation - Cloning into vectors - Sequencing - Computer-based assembly
(2) Fragmentation - Isolation of DNA - Sequencing - Cloning into vectors - Computer-based assembly
(3) Isolation of DNA - Sequencing - Fragmentation - Cloning into vectors - Computer-based assembly
(4) Cloning into vectors - Isolation of DNA - Fragmentation - Sequencing - Computer-based assembly
(5) Question not attempted

114. According to the findings of the Human Genome Project, the total number of estimated genes in humans is approximately:
(1) 10,000 - 15,000
(2) 20,000 - 25,000
(3) 80,000 - 100,000
(4) Over 150,000
(5) Question not attempted

115. Which chromosome was the last to be completely sequenced in the Human Genome Project (completed in 2006)?
(1) Chromosome 1
(2) Chromosome 21
(3) Chromosome Y
(4) Chromosome X
(5) Question not attempted

116. In the context of the Human Genome Project, what does SNP stand for?
(1) Simple Nuclear Protein
(2) Single Nucleotide Polymorphism
(3) Standard Nucleic Polymer
(4) Sequential Nucleotide Pairing
(5) Question not attempted

NODIA

117. The branch of science that evolved alongside the Human Genome Project for storing, retrieving, and analyzing massive biological data is called:
(1) Biomechanics
(2) Bioinformatics
(3) Bioremediation
(4) Biomimetics
(5) Question not attempted

118. Which of the following was not a primary goal of the Human Genome Project?
(1) Cloning a human being
(2) Identifying all the genes in human DNA
(3) Determining the sequences of the 3 billion chemical base pairs
(4) Addressing the ethical, legal, and social issues (ELSI) arising from the project

molecular scale. What is the standard size range defining the nanoscale?
(1) 1 to 100 micrometers
(2) 1 to 100 millimeters
(3) 0.1 to 1 nanometer
(4) 1 to 100 nanometers
(5) Question not attempted

172. Match List-I with List-II regarding nanomaterials:
List I: (Nanomaterial)
A. Graphene
B. Carbon Nanotubes (CNTs)
C. Quantum dots
D. Fullerenes (Buckyballs)
List II: (Characteristic)
i. Hollow spherical cages of 60 carbon atoms
ii. Semiconductor nanocrystals with unique optical properties
iii. Cylindrical carbon structures with exceptional tensile strength
iv. A single layer of carbon atoms arranged in a 2D hexagonal lattice
(1) A-iv, B-iii, C-ii, D-i
(2) A-i, B-ii, C-iii, D-iv
(3) A-iv, B-i, C-ii, D-iii
(4) A-iii, B-iv, C-i, D-ii
(5) Question not attempted

173. Consider the following statements about nanotechnology:
I. Nanomaterials exhibit significantly different physical and chemical properties compared to their bulk counterparts.
II. An increase in the surface area-to-volume ratio at the nanoscale often increases chemical reactivity.
III. Richard Feynman is widely considered a founding father of nanotechnology concepts.
Which of the above statement(s) is/are correct?
(1) I and II only
(2) II and III only
(3) I and III only
(4) I, II and III
(5) Question not attempted

174. A nanometer is equal to:
(1) 10^{-6} meters
(2) 10^{-9} meters
(3) 10^{-12} meters
(4) 10^{-15} meters
(5) Question not attempted

175. Which phenomenon explains why quantum dots emit light of varying colors depending on their size?
(1) Tyndall effect
(2) Photoelectric effect
(3) Quantum confinement
(4) Brownian motion
(5) Question not attempted

176. Which of the following approaches involves assembling atoms or molecules to build nanoscale structures?
(1) Bottom-up approach
(2) Top-down approach
(3) Lithography
(4) Milling
(5) Question not attempted

177. Identify the incorrect statement regarding nanomaterials.
(1) Gold at the nanoscale can appear red or purple instead of golden.
(2) Bulk materials broken down to nanoscale increase their relative surface area.
(3) Graphene is the thinnest known material but exceptionally strong.
(4) Carbon nanotubes are poorer conductors of electricity than wood.
(5) Question not attempted

178. The scanning tunneling microscope (STM) and atomic force microscope (AFM) are essential tools in nanotechnology because they allow scientists to:
(1) Measure the speed of light
(2) Observe and manipulate individual atoms and molecules
(3) Alter the DNA sequence of a cell
(4) Sequence entire genomes
(5) Question not attempted

179. What makes carbon nanotubes highly desirable for use in materials science?
(1) They are easily dissolved in water.
(2) They are naturally occurring in all living cells.
(3) They have high tensile strength and excellent electrical conductivity.

Downloaded from www.pdf.tube

(1) It can be used to knock out a specific gene to study its function.
(2) It can introduce new genetic material at a specific locus (knock-in).
(3) It works efficiently in eukaryotic cells, including human cells.
(4) It requires no guide sequence and randomly cuts DNA.
(5) Question not attempted

128. What happens immediately after Cas9 makes a double-strand break in the target DNA?
(1) The cell's natural DNA repair mechanisms try to fix the break.
(2) The cell immediately dies due to DNA damage.
(3) The entire chromosome is degraded by exonucleases.
(4) The cell undergoes rapid and uncontrolled division.
(5) Question not attempted

129. Off-target effects in CRISPR technology refer to:
(1) The inability of Cas9 to enter the cell nucleus
(2) The guide RNA degrading before binding
(3) Cas9 cutting DNA at unintended sites with similar sequences
(4) The target gene mutating further after successful editing
(5) Question not attempted

130. Gene drive is a controversial application of CRISPR that allows:
(1) Rapid sequencing of complex somatic cancer genomes
(2) Reprogramming of adult cells into pluripotent cells
(3) Delivery of genetic material across the blood-brain barrier
(4) Promoting universal inheritance of a genetic alteration
(5) Question not attempted

131. Stem cells possess two fundamental properties: self-renewal and the ability to differentiate into specialized cell types. Cells that can develop into a complete organism are termed:
(1) Pluripotent
(2) Totipotent
(3) Multipotent
(4) Unipotent
(5) Question not attempted

132. Consider the following statements regarding stem cells:
Statement I: Adult stem cells are generally multipotent, meaning they can only differentiate into a limited number of cell types related to their tissue of origin.
Statement II: Embryonic stem cells, derived from the inner cell mass of a blastocyst, are pluripotent and can form any cell type in the adult body.
Which of the following represents the correct option?
(1) Both Statement I and Statement II are correct.
(2) Both Statement I and Statement II are incorrect.
(3) Statement I is correct but Statement II is incorrect.
(4) Statement I is incorrect but Statement II is correct.
(5) Question not attempted

133. Consider the following statements about Induced Pluripotent Stem Cells (iPSCs):
I. They are adult somatic cells genetically reprogrammed to an embryonic stem cell-like state.
II. Their creation bypasses the ethical concerns associated with destroying human embryos.
III. They can only differentiate into blood cells.
Which of the above statement(s) is/are correct?
(1) I and II only
(2) II and III only
(3) I and III only
(4) I, II and III
(5) Question not attempted

134. Bone marrow transplantation is a well-established clinical therapy that utilizes which type of stem cells?
(1) Embryonic stem cells
(2) Neural stem cells
(3) Induced pluripotent stem cells
(4) Hematopoietic stem cells
(5) Question not attempted

NODIA

selective breeding
(4) Expression of foreign genetic material via recombinant DNA
(5) Question not attempted

102. Match List-I with List-II regarding genetically modified crops:
List I: (GM Crop)
A. Bt Cotton
B. Golden Rice
C. Flavr Savr Tomato
D. GM Mustard (DMH-11)
List II: (Specific Trait)
i. Delayed ripening
ii. Insect resistance against bollworms
iii. Herbicide tolerance and higher yield
iv. Biofortified with Vitamin A precursor
(1) A-ii, B-iv, C-i, D-iii
(2) A-i, B-ii, C-iv, D-iii
(3) A-ii, B-i, C-iii, D-iv
(4) A-iv, B-iii, C-i, D-ii
(5) Question not attempted

103. Consider the following statements regarding Bt cotton:
I. It contains cry genes isolated from the bacterium Bacillus thuringiensis.
II. The Bt toxin protein is produced in the plant as an inactive protoxin.
III. The toxin is activated by the alkaline pH of the insect gut.
IV. It is currently approved for commercial cultivation in India.
Which of the above statement(s) is/are correct?
(1) I, II and III
(2) I, II and IV
(3) II, III and IV
(4) I, II, III and IV
(5) Question not attempted

104. Golden Rice is a genetically modified crop engineered to produce high levels of:
(1) Vitamin C
(2) Beta-carotene
(3) Iron
(4) Essential amino acids
(5) Question not attempted

105. The toxic protein produced by Bacillus thuringiensis does not kill the bacterium itself because:
(1) The bacterium produces an antidote.
(2) The bacterium lacks the gut receptors for the toxin.
(3) The toxin exists as an inactive protoxin crystal inside the bacterium.
(4) The bacterium has a highly acidic cytoplasm.
(5) Question not attempted

106. Which of the following is an environmental concern associated with the cultivation of Genetically Modified (GM) crops?
(1) Increased requirement of chemical fertilizers
(2) The potential for gene flow to wild relatives, creating superweeds
(3) Decreased crop yields
(4) Complete elimination of non-target beneficial insects in all cases
(5) Question not attempted

107. Identify the incorrect statement regarding transgenic animals.
(1) They are extensively used to test the safety of vaccines before human use.
(2) They are designed to study complex human diseases like cancer and Alzheimer's.
(3) The first transgenic cow, Rosie, produced human protein-enriched milk.
(4) Transgenic animals cannot be used for chemical safety testing.
(5) Question not attempted

108. The term biofortification in agriculture refers to:
(1) Breeding crops to increase their nutritional value.
(2) Using bio-fertilizers instead of chemical fertilizers.
(3) Creating crops that are resistant to all pests.
(4) Fortifying agricultural fields with heavy metals.
(5) Question not attempted

109. What triggers the activation of the Bt toxin in the gut of the target insect?
(1) Acidic pH
(2) High temperature
(3) Alkaline pH
(4) Specific enzymes from the insect's saliva
(5) Question not attempted

Click Here to Buy book on Amazon

144. Gene therapy was first successfully applied clinically in 1990 to treat a four-year-old girl suffering from:
(1) Cystic fibrosis
(2) Sickle cell anaemia
(3) Muscular dystrophy
(4) Adenosine Deaminase (ADA) deficiency
(5) Question not attempted

145. Recombinant DNA technology has allowed the development of safer vaccines. The Hepatitis B vaccine is produced using:
(1) Yeast cells genetically engineered to produce the viral surface antigen
(2) Killed Hepatitis B virus
(3) Live attenuated Hepatitis B virus
(4) Human blood plasma from infected patients
(5) Question not attempted

146. Which of the following is an advantage of genetically engineered antibiotics over traditional ones?
(1) Complete immunity to the development of drug resistance
(2) Large-scale production and modification to combat bacteria
(3) Synthesis of antimicrobial agents without biological hosts
(4) Effective clinical management of systemic viral infections
(5) Question not attempted

147. Hybridoma technology is primarily used for the production of:
(1) Recombinant vaccines
(2) Monoclonal antibodies
(3) Synthetic insulin
(4) Artificial chromosomes
(5) Question not attempted

148. Identify the incorrect statement regarding gene therapy.
(1) Germline gene therapy is widely practiced globally and is free from ethical restrictions.
(2) It involves replacing a defective gene with a functional healthy gene.
(3) Viral vectors like retroviruses and adenoviruses are commonly used to deliver genes.
(4) Somatic cell gene therapy changes only the cells of the treated individual, not their offspring.
(5) Question not attempted

149. The process of analyzing a patient's genetic profile to tailor medical treatments and drug dosages is known as:
(1) Gene cloning
(2) Bioremediation
(3) Pharmacogenomics
(4) Xenotransplantation
(5) Question not attempted

150. What is a key limitation of using retroviral vectors in gene therapy?
(1) Inability of viral particles to infect human host cells
(2) Inherent structural incapacity to carry RNA material
(3) Induction of systemic and fatal immune responses in man
(4) Random genomic integration triggering oncogenic changes
(5) Question not attempted

NODIA

151. Bioremediation is the use of living organisms, primarily microbes, to:
(1) Synthesize bioplastics
(2) Degrade or detoxify environmental pollutants
(3) Produce biofuels like ethanol
(4) Extract valuable metals from deep mines
(5) Question not attempted

152. Match List-I with List-II regarding bioremediation concepts:
List I: (Bioremediation concept)
A. Biostimulation
B. Bioaugmentation
C. Phytoremediation
D. Biosparging
List II: (Description)
i. Adding specific cultured microorganisms to a contaminated site
ii. Using plants to absorb, accumulate, or detoxify pollutants
iii. Adding nutrients and oxygen to stimulate native microbes
iv. Injecting air into groundwater to increase oxygen for microbes
(1) A-iii, B-i, C-ii, D-iv
(2) A-i, B-ii, C-iii, D-iv

135. The generation of tissues or organs from stem cells to replace damaged ones is the primary goal of:
(1) Gene therapy
(2) Regenerative medicine
(3) Pharmacogenomics
(4) Bioremediation
(5) Question not attempted

136. Which of the following represents an ethical concern exclusively associated with human embryonic stem cell research?
(1) It requires the destruction of early-stage human embryos.
(2) It leads to the creation of bioweapons.
(3) It uses harmful radiation protocols.
(4) It exploits adult donors.
(5) Question not attempted

137. Identify the correct pair regarding stem cell types:
(1) Zygote - Multipotent
(2) Mesenchymal stem cells - Totipotent
(3) Inner cell mass of blastocyst - Pluripotent
(4) Skin stem cells - Pluripotent
(5) Question not attempted

138. Which scientist was awarded the Nobel Prize in 2012 for the discovery that mature cells can be reprogrammed to become pluripotent (iPSCs)?
(1) Ian Wilmut
(2) Shinya Yamanaka
(3) Craig Venter
(4) Alexander Fleming
(5) Question not attempted

139. Which of the following is not a current or potential therapeutic application of stem cells?
(1) Management and potential cure for forms of leukemia
(2) Regeneration of cardiac muscle after heart attacks
(3) Substitution of lost dopamine neurons in Parkinson's
(4) Correction of chromosomal abnormalities in adult patients
(5) Question not attempted

140. Cord blood banked after childbirth is a rich source of:
(1) Hematopoietic stem cells
(2) Embryonic stem cells
(3) Totipotent stem cells
(4) Unipotent stem cells
(5) Question not attempted

141. The first commercially produced genetically engineered human hormone was:
(1) Somatotropin
(2) Thyroxine
(3) Insulin (Humulin)
(4) Glucagon
(5) Question not attempted

142. Match List-I with List-II regarding biotech products and their applications:
List I: (Biotech product)
A. Tissue Plasminogen Activator (tPA)
B. Erythropoietin
C. Interferons
D. Humulin
List II: (Medical application)
i. Treatment of diabetes mellitus
ii. Dissolving blood clots in stroke or heart attack patients
iii. Stimulating red blood cell production in anemia
iv. Antiviral and anticancer therapies
(1) A-ii, B-iii, C-iv, D-i
(2) A-i, B-ii, C-iii, D-iv
(3) A-iii, B-iv, C-i, D-ii
(4) A-ii, B-i, C-iv, D-iii
(5) Question not attempted

143. Consider the following statements regarding the production of recombinant human insulin:
I. It is produced by inserting the human insulin gene into E. coli.
II. The A and B chains are produced separately and then linked by disulfide bonds.
III. Eli Lilly was the first company to produce it in 1983.
IV. Recombinant insulin causes severe allergic reactions in most patients, unlike animal insulin.
Which of the above statement(s) is/are correct?
(1) I, II and IV
(2) I, III and IV
(3) I, II and III
(4) II, III and IV
(5) Question not attempted

Downloaded from www.pdf.tube

Reason (R): RNAi prevents the translation of specific essential mRNAs of the nematode, leading to its death when it feeds on the plant.
Select the correct answer from the codes given below:
(1) Both A and R are true and R is the correct explanation of A.
(2) Both A and R are true but R is not the correct explanation of A.
(3) A is true but R is false.
(4) A is false but R is true.
(5) Question not attempted

162. Consider the following steps of plant tissue culture (micropropagation):
A. Hardening and acclimatization of plantlets
B. Inoculation of explant on culture medium
C. Selection and sterilization of explant
D. Callus formation and regeneration of shoots/roots
Which of the following represents the correct sequence?
(1) C, B, D, A
(2) B, C, D, A
(3) C, D, B, A
(4) D, C, B, A
(5) Question not attempted

163. The capacity of a single plant cell to regenerate into an entire adult plant is known as:
(1) Pluripotency
(2) Totipotency
(3) Apomixis
(4) Parthenocarpy
(5) Question not attempted

164. In plant tissue culture, an unorganized mass of actively dividing cells is called a:
(1) Callus
(2) Zygote
(3) Somatic embryo
(4) Protoplast
(5) Question not attempted

165. Which nematode infects the roots of tobacco plants causing a great reduction in yield, which is countered by RNAi technology?
(1) Ascaris lumbricoides
(2) Caenorhabditis elegans
(3) Meloidogyne incognita
(4) Wuchereria bancrofti
(5) Question not attempted

166. Genetic variations observed in plants regenerated from tissue culture are called:
(1) Point mutations
(2) Somaclonal variations
(3) Hybrid vigor
(4) Transgenic variations
(5) Question not attempted

167. To produce virus-free plants from a virus-infected plant via tissue culture, which specific part of the plant is used as an explant?
(1) Mature leaf
(2) Root hair
(3) Bark
(4) Meristem (apical or axillary)
(5) Question not attempted

168. The fusion of isolated protoplasts from two different plant species to create a hybrid (like the Pomato) is an example of:
(1) Somatic hybridization
(2) Recombinant DNA technology
(3) Clonal selection
(4) Mutation breeding
(5) Question not attempted

NODIA

169. What is the role of polyethylene glycol (PEG) in agricultural biotechnology?
(1) It is used as a fertilizer.
(2) It kills nematodes in the soil.
(3) It induces the fusion of plant protoplasts.
(4) It acts as a selectable marker in transgenic crops.
(5) Question not attempted

170. Which of the following best describes the principle of RNA interference (RNAi)?
(1) Gene silencing via complementary double-stranded RNA
(2) Expression of specialized toxic proteins from DNA
(3) Enhancement of the transcriptional rate of a target gene
(4) Irreversible genomic mutation of the target sequence
(5) Question not attempted

171. Nanotechnology primarily deals with the manipulation of matter on an atomic and

(3) A-iii, B-iv, C-i, D-ii
(4) A-ii, B-i, C-iv, D-iii
(5) Question not attempted

153. Consider the following statements about bioremediation:
I. Pseudomonas putida is a genetically engineered superbug used for cleaning oil spills.
II. Bioremediation is generally more cost-effective and eco-friendly than chemical cleanup methods.
III. Heavy metals like lead and mercury can be easily completely destroyed by microbial bioremediation.
IV. Phytomining uses plants to extract precious metals from low-grade ores.
V. Ex-situ bioremediation involves treating contaminated soil at the site without removing it.
Which of the above statement(s) is/are correct?
(1) I, II and IV
(2) I, III and V
(3) II, IV and V
(4) I, II and III
(5) Question not attempted

154. The genetically engineered bacterium Pseudomonas putida, known for degrading multiple components of petroleum oil, was developed by:
(1) Ananda Mohan Chakrabarty
(2) Har Gobind Khorana
(3) M.S. Swaminathan
(4) Louis Pasteur
(5) Question not attempted

155. Which of the following is a limitation of bioremediation?
(1) Generation of large volumes of secondary chemical waste
(2) High speed of degradation compared to thermal incineration
(3) Dependency on environmental parameters like pH and nutrients
(4) Functional effectiveness restricted to radioactive atoms
(5) Question not attempted

156. The use of fungi to degrade environmental contaminants is specifically known as:
(1) Phytoremediation
(2) Phycoremediation
(3) Zooremediation
(4) Mycoremediation
(5) Question not attempted

157. Which of the following is an example of in-situ bioremediation?
(1) Composting
(2) Bioventing
(3) Bioreactors
(4) Landfarming
(5) Question not attempted

158. Some plants hyperaccumulate heavy metals from contaminated soils. These plants can then be harvested and safely disposed of. This technique is called:
(1) Phytoextraction
(2) Phytostimulation
(3) Phytovolatilization
(4) Phytodegradation
(5) Question not attempted

159. Identify the incorrect statement about superbugs in bioremediation.
(1) They are multigene engineered microbes designed to degrade complex pollutants.
(2) The first patent for a living genetically modified organism was for a superbug.
(3) They can degrade recalcitrant compounds like plastics instantly.
(4) Their survival in the open environment is carefully monitored to prevent ecological imbalance.
(5) Question not attempted

160. Bioremediation of municipal wastewater typically involves secondary treatment, where aerobic bacteria consume organic waste to form masses called:
(1) Slag
(2) Prions
(3) Biofilms
(4) Flocs
(5) Question not attempted

161. Given below are two statements, one labeled as Assertion (A) and the other as Reason (R):
Assertion (A): RNA interference (RNAi) is used to develop nematode-resistant tobacco plants.

Click Here to Buy book on Amazon

(4) They block all electromagnetic radiation.
(5) Question not attempted

180. The famous 1959 lecture "There's Plenty of Room at the Bottom", which conceptually launched nanotechnology, was given by:
(1) Richard Feynman
(2) Albert Einstein
(3) K. Eric Drexler
(4) Sumio Iijima
(5) Question not attempted

181. Consider the following statements regarding applications of nanotechnology in medicine (nanomedicine):
I. Nanoparticles can be engineered for targeted drug delivery to cancer cells, minimizing damage to healthy cells.
II. Magnetic nanoparticles are used as contrast agents to enhance MRI imaging.
III. Nanoshells can be injected into tumors and heated using infrared light to destroy cancer cells.
IV. Nanorobots are currently widely used in hospitals to perform complex open-heart surgeries independently.
Which of the above statement(s) is/are correct?
(1) I, II and IV
(2) I, III and IV
(3) I, II and III
(4) II, III and IV
(5) Question not attempted

182. Consider the following statements about nanotechnology applications:
I. Zinc oxide and titanium dioxide nanoparticles are used in sunscreens because they absorb UV light and are transparent on the skin.
II. Silver nanoparticles are integrated into wound dressings and fabrics for their strong antimicrobial properties.
III. Nanofilters can remove viruses and heavy metal ions from contaminated water.
IV. Quantum dots are used in modern displays (QLED TVs) for brighter and more accurate colors.
V. Nanomaterials are unable to store hydrogen for clean energy applications.
Which of the above statement(s) is/are correct?
(1) I, II, III and IV
(2) I, II, IV and V
(3) II, III, IV and V
(4) I, III, IV and V
(5) Question not attempted

183. In the field of electronics, the integration of nanotechnology allows for:
(1) The creation of heavier and bulkier transistors
(2) Moore's law to continue by miniaturizing transistors to the nanoscale
(3) The complete replacement of electricity with mechanical gears
(4) Decreased data storage capacities
(5) Question not attempted

184. The use of silver nanoparticles (AgNPs) in consumer products like socks and refrigerators is primarily due to their:
(1) Antimicrobial and antibacterial properties
(2) High electrical conductivity
(3) Ability to absorb moisture
(4) High refractive index
(5) Question not attempted

185. Which application uses nanostructured materials to significantly increase the efficiency of converting sunlight into electricity?
(1) Lithium-ion batteries
(2) Fuel cells
(3) Photovoltaic (solar) cells
(4) Supercapacitors
(5) Question not attempted

186. Nanoparticles can cross the blood-brain barrier. This property is advantageous for:
(1) Induction of widespread neurotoxicity in the brain
(2) Prevention of viral infections located in the lungs
(3) Clinical diagnosis of complex skeletal fractures
(4) Treatment of neurological conditions and brain tumors
(5) Question not attempted

187. What is a "lab-on-a-chip"?
(1) Miniature electronic tracking component for laboratories
(2) Device for analyzing small fluid volumes on a microchip

Downloaded from www.pdf.tube

36. (4) Maintenance of genomic stability during DNA replication
Telomeres are repetitive nucleotide sequences located at the extreme ends of linear chromosomes. Their primary role is to protect the ends of the DNA from deterioration or fusion with neighboring chromosomes. Because DNA polymerase cannot fully replicate the very tips of chromosomes, telomeres act as a buffer, ensuring that essential genetic information is not lost during successive rounds of cellular division and replication.

37. (2) 44 Autosomes + XY
The karyotype of a normal human male consists of forty-six chromosomes in total. This includes twenty-two pairs of autosomes, which equals forty-four autosomes, and one pair of sex chromosomes consisting of one X and one Y chromosome. This chromosomal arrangement distinguishes males from females, who possess two X chromosomes alongside the forty-four autosomes. This genetic configuration is established at the moment of fertilization.

38. (1) Kinetochore
The kinetochore is a complex protein structure that forms on the centromere of each sister chromatid during cell division. Its essential function is to provide an attachment point for the spindle fibers. These fibers then pull the chromatids apart toward opposite poles of the cell during mitosis or meiosis, ensuring that each new daughter cell receives an accurate and complete set of chromosomes.

39. (3) Plasmid
Centromeres, chromatids, and telomeres are all integral structural components of eukaryotic chromosomes found within the cell nucleus. In contrast, a plasmid is a small, circular, extra-chromosomal DNA molecule found primarily in bacteria. Plasmids replicate independently of the main bacterial chromosome and are not part of the standard structural anatomy of the linear chromosomes found in higher eukaryotic organisms like humans.

40. (4) Nucleosome
A nucleosome is the fundamental repeating subunit of chromatin in eukaryotic cells. It consists of approximately 147 base pairs of DNA wrapped twice around a core of eight histone proteins. This beads-on-a-string structure allows for the efficient compaction of long DNA molecules into the small space of the cell nucleus while still permitting access for essential processes like transcription and replication.

41. (3) Point mutation
A point mutation is a type of genetic alteration where a single nucleotide base is changed, inserted, or deleted from a DNA or RNA sequence. When one base is substituted for another, it can result in various outcomes, such as changing a single amino acid in a protein or having no effect at all. These mutations are the smallest scale of genetic variation that can occur.

42. (1) Both A and R are true and R is the correct explanation of A.
Frameshift mutations occur when nucleotides are inserted or deleted in numbers not divisible by three. Because the genetic code is read in triplets, this shifts the entire reading frame for all subsequent codons. This usually results in a completely different and often non-functional protein. In contrast, a point mutation typically affects only one codon, making its impact generally less severe than a frameshift.

43. (1) Ultraviolet (UV) radiation
Mutagens are agents that increase the frequency of mutations in an organisms DNA. Physical mutagens include various forms of high-energy radiation. Ultraviolet radiation is a well-known physical mutagen that causes the formation of pyrimidine dimers, particularly thymine dimers, which distort the DNA structure. This contrasts with chemical mutagens like nitrous acid or mustard gas, which interact chemically with the nitrogenous bases.

44. (3) I and III only
Germline mutations occur in the reproductive cells and are passed on to offspring, making them heritable. Silent mutations are changes in the DNA sequence that do not alter the resulting amino acid sequence due to the redundancy of the genetic code. Somatic mutations, however, occur in non-reproductive body cells and are not inherited by future generations, affecting only the individual in whom they occur.

NODIA

(3) Selection of non-medical embryo traits like appearance
(4) Therapeutic use of stem cells for organ regeneration
(5) Question not attempted

196. The deliberate release of viruses, bacteria, or other germs to cause illness or death in people, animals, or plants is termed:
(1) Bioremediation
(2) Bioprospecting
(3) Biofortification
(4) Bioterrorism
(5) Question not attempted

197. Which of the following ethical issues is directly associated with the mandatory collection of DNA for national databases?
(1) Risks of genetic discrimination by insurance providers
(2) Ethical threats regarding the creation of designer kids
(3) Biological danger associated with producing superbugs
(4) Ecological impact from the transfer of genes to flora
(5) Question not attempted

198. Eugenics, a scientifically and ethically discredited practice, involves:
(1) Application of genetics to remedy somatic cell disease
(2) Systematic genomic sequencing of species facing extinction
(3) Breeding programs aimed at increasing desirable traits
(4) Laboratory synthesis of genomes from basic components
(5) Question not attempted

199. The convention established to ensure the fair and equitable sharing of benefits arising out of the utilization of genetic resources is the:
(1) Kyoto Protocol
(2) Montreal Protocol
(3) Paris Agreement
(4) Nagoya Protocol
(5) Question not attempted

200. What is a major ethical objection often raised by environmental groups against the cultivation of Genetically Modified (GM) crops?
(1) Requirement for significantly more intensive human labor
(2) Corporate control over seeds and restriction of saving
(3) Perception that modified crops possess the same flavor
(4) Measurable reduction in the carbon footprint of farming
(5) Question not attempted

www.nodia.in

Click Here to Buy book on Amazon

(3) Implantable microchip designed for monitoring animals
(4) Atomic-scale storage cell for high-resolution microscopes
(5) Question not attempted

188. In energy storage, how do nanomaterials improve the performance of batteries (e.g., lithium-ion)?
(1) Larger surface area for efficient charge transport
(2) Reduction of surface area across internal electrodes
(3) Increase in the time required for a charging cycle
(4) Addition to the overall physical weight of the battery
(5) Question not attempted

189. Identify the potential negative impact (toxicity) associated with nanotechnology.
(1) Inability of nanomaterials to be inhaled deeply
(2) Instant environmental decomposition of particles
(3) Inhaled particles entering the blood and causing harm
(4) Complete absence of chemical reactivity in materials
(5) Question not attempted

190. The term 'smart drugs' in nanotechnology refers to drugs that:
(1) Targeted delivery systems that release under conditions
(2) Pharmacological agents designed to enhance cognition
(3) Medicinal compounds synthesized entirely through the AI
(4) Therapeutic substances that do not require FDA approval
(5) Question not attempted

191. Consider the following statements regarding the Genetic Engineering Appraisal Committee (GEAC):
Statement I: GEAC is the apex body in India responsible for approving the commercial release of genetically modified crops.
Statement II: GEAC functions under the Ministry of Environment, Forest and Climate Change.
Which of the following represents the correct option?
(1) Both Statement I and Statement II are correct.
(2) Both Statement I and Statement II are incorrect.
(3) Statement I is correct but Statement II is incorrect.
(4) Statement I is incorrect but Statement II is correct.
(5) Question not attempted

192. Biopiracy refers to:
(1) Unauthorized exploitation of resources and knowledge
(2) Legal acquisition of materials from developing nations
(3) Illegal duplication and distribution of specialized apps
(4) Unintentional introduction of invasive species in nature
(5) Question not attempted

193. The controversial patenting of which famous Indian agricultural product by an American company in the late 1990s is a classic example of biopiracy?
(1) Bt Cotton
(2) Golden Rice
(3) Flavr Savr Tomato
(4) Basmati Rice
(5) Question not attempted

194. Which of the following traditional Indian plants was the subject of a major biopiracy battle regarding its wound-healing properties, leading to the revocation of a US patent?
(1) Tulsi
(2) Turmeric (Haldi)
(3) Neem
(4) Ashwagandha
(5) Question not attempted

195. The concept of creating designer babies primarily raises profound ethical concerns regarding:
(1) Routine diagnostic use of ultrasound imaging technology
(2) Clinical evaluation of drugs on human research volunteers

NODIA

9. (3) Uracil replaces thymine in the complementary strand
DNA contains four nitrogenous bases: adenine, guanine, cytosine, and thymine. While uracil is a pyrimidine found in ribonucleic acid, it is not a standard component of deoxyribonucleic acid under normal conditions. In DNA, thymine is the base that pairs with adenine. Other features include a deoxyribose sugar and a constant helix diameter of approximately twenty Angstroms across the molecule.

10. (1) Replication
Replication is the biological process by which a cell creates an identical duplicate of its entire DNA molecule. This occurs during the S-phase of the cell cycle to ensure that both resulting daughter cells receive a complete set of genetic instructions. The process is semi-conservative, meaning each new double helix consists of one original strand and one newly synthesized strand.

11. (4) A specific DNA segment encoding a functional protein or RNA
A gene represents the basic physical and functional unit of heredity. Structurally, it is a specific sequence of nucleotides located at a particular position on a chromosome. These segments contain the coded instructions required to synthesize functional products, such as polypeptide chains or various types of RNA molecules, which ultimately determine the traits and characteristics of a living organism.

12. (2) Locus
The term locus refers to the fixed, specific physical position that a gene or a particular DNA sequence occupies on a chromosome. Mapping these locations is essential for understanding genetic linkage and inheritance patterns. In diploid organisms, homologous chromosomes contain the same genes at identical loci, although the specific alleles present at those positions may differ between the two.

13. (1) B, A, C, D
Gene expression begins with transcription, where RNA polymerase creates a messenger RNA transcript from the DNA template. This mRNA then exits the nucleus to reach the cytoplasm. Next, ribosomes translate the mRNA sequence into a polypeptide chain by assembling amino acids. Finally, the resulting chain undergoes specific folding and post-translational modifications to become a functional protein with a defined structure.

14. (1) A-iv, B-iii, C-i, D-ii
A gene contains several distinct regions that regulate and encode information. The promoter acts as the initial binding site for RNA polymerase to start transcription. Exons are the coding sequences that remain in the final messenger RNA, while introns are non-coding regions removed during splicing. The terminator sequence signals the end of the transcription process to the molecular machinery.

15. (1) DNA to RNA to Protein
The Central Dogma of molecular biology describes the directional flow of genetic information within biological systems. Information stored in the DNA is first transcribed into messenger RNA molecules. Subsequently, this RNA serves as a template for translation by ribosomes, which synthesize specific proteins. This fundamental framework explains how the genetic code is converted into functional biological molecules and traits.

16. (2) Alleles
Alleles are alternative forms of the same gene that arise by mutation and are found at the same place on a chromosome. They account for the diversity in inherited characteristics among individuals of the same species. For any given trait, an organism may inherit identical alleles, known as homozygous, or different alleles, which is referred to as a heterozygous condition.

17. (2) Group of genes transcribed together from a single promoter
An operon is a functional unit of genomic DNA found primarily in prokaryotes. It consists of a cluster of related genes under the control of a single promoter and regulatory sequences. This arrangement allows the cell to efficiently coordinate the expression of multiple proteins required for a specific metabolic pathway, ensuring they are produced simultaneously in response to environmental stimuli.

Downloaded from www.pdf.tube

18. (1) Polypeptides
The primary result of gene expression is the synthesis of polypeptide chains. Through the processes of transcription and translation, the genetic code within DNA is utilized to assemble specific sequences of amino acids. These polypeptides then undergo complex folding to form functional proteins. While proteins regulate the synthesis of lipids and carbohydrates, the direct product of a gene is a polypeptide.

19. (3) Homozygous - Two identical alleles at a locus
Homozygous refers to a genetic condition where an individual inherits two identical versions of a particular gene from both parents. This contrasts with the heterozygous state, where the two alleles at a specific locus are different. Genotype represents the internal genetic makeup, while phenotype describes the observable physical traits. Accurate terminology is essential for predicting inheritance patterns in classical Mendelian genetics.

20. (4) Ribosome
Ribosomes are the cellular organelles responsible for the translation phase of gene expression. They serve as the site where messenger RNA is read and converted into a specific sequence of amino acids to form a protein. These structures can be found floating freely in the cytoplasm or attached to the rough endoplasmic reticulum, facilitating the synthesis of essential biological molecules for the cell.

21. (3) Alleles separate into gametes and unite at fertilization
Mendels Law of Segregation states that during the formation of gametes, the two alleles for a heritable character separate from each other. Consequently, each gamete carries only one allele for every gene. The original paired condition is restored during fertilization when two gametes unite. This fundamental principle ensures that offspring receive one genetic contribution from each parent for every trait.

22. (3) 3:1
In a standard Mendelian monohybrid cross, the F2 generation typically displays a phenotypic ratio of 3:1. This occurs when two heterozygous F1 individuals are crossed. Three-quarters of the offspring will exhibit the dominant trait, while one-quarter will show the recessive trait. This ratio reflects the underlying genotypic distribution of one homozygous dominant, two heterozygous, and one homozygous recessive individual.

23. (2) II, III and IV only
Mendels dihybrid crosses involved the simultaneous study of two distinct traits, providing the basis for his laws. The law of segregation is a universal principle in diploid organisms during gamete formation. Mendel used the garden pea, Pisum sativum, for his research. However, the law of independent assortment does not apply to genes located very close together on the same chromosome.

24. (1) Genotype of an individual showing a dominant phenotype
A test cross is a genetic tool used to determine whether an organism expressing a dominant trait is homozygous or heterozygous. This is achieved by breeding the individual with a homozygous recessive organism. If any offspring display the recessive phenotype, the parent must be heterozygous. This method is fundamental for verifying the genetic composition of organisms in classical breeding experiments.

25. (3) Law of Independent Assortment
The 9:3:3:1 phenotypic ratio in a dihybrid cross is a direct consequence of the Law of Independent Assortment. This principle states that the alleles of two or more different genes get sorted into gametes independently of one another. As a result, the inheritance of one trait does not influence the inheritance of another, leading to diverse combinations in the offspring.

26. (1) Linked genes on the same chromosome
Linked genes are those located close together on the same chromosome. Because they are physically near each other, they tend to be inherited together during meiosis rather than assorting independently. This proximity interferes with the expected Mendelian ratios, such as the 9:3:3:1 dihybrid ratio. Genetic linkage represents a major exception to Mendels original observations regarding the independent assortment of traits.

NODIA

27. (4) F1 progeny of true-breeding parents show mixed phenotypes
When two true-breeding parents with contrasting traits are crossed, the F1 generation typically exhibits a uniform phenotype. In cases of complete dominance, all offspring will display the dominant trait rather than a mix or intermediate phenotype. Recessive traits only reappear in the F2 generation. Other Mendelian principles hold that gametes carry one allele and segregation occurs during the process of meiosis.

28. (2) Alternative forms of a single gene
Alleles are defined as alternative versions of a single gene that reside at the same locus on homologous chromosomes. They arise through mutations and lead to variations in the observable traits of an organism. For example, a gene for flower color might have one allele for purple and another for white. These variations form the basis for genetic diversity and inheritance patterns.

29. (2) Rr
In a cross between a homozygous dominant plant (RR) and a homozygous recessive plant (rr), all offspring in the F1 generation will receive one dominant allele and one recessive allele. Therefore, the resulting genotype for all individuals in the F1 generation is Rr. Phenotypically, these plants will all display the dominant round seed trait despite being carriers of the wrinkled seed allele.

30. (4) Root length
Gregor Mendel focused his genetic research on seven specific, easily observable traits in the garden pea plant. These included seed shape, seed color, flower color, pod shape, pod color, flower position, and stem height. Root length was not among the characteristics he systematically studied. His careful selection of these clear, binary traits allowed him to derive the fundamental laws of heredity.

31. (1) Autosomes
Autosomes are the chromosomes in an organism that are not involved in determining the sex of an individual. In humans, there are twenty-two pairs of autosomes. These chromosomes carry the majority of the genetic information responsible for general bodily functions and physical characteristics. This distinguishes them from the sex chromosomes, or allosomes, which specifically determine the biological sex of the offspring.

32. (1) 22 pairs
A normal human karyotype consists of twenty-three pairs of chromosomes, totaling forty-six in each somatic cell. Out of these, twenty-two pairs are classified as autosomes. These pairs are homologous and contain genes for traits unrelated to sex determination. The remaining twenty-third pair consists of the sex chromosomes, which are XX in females and XY in males, completing the full genetic complement.

33. (2) Heterochromatin
Heterochromatin refers to regions of the chromosome that remain highly condensed and tightly packed throughout the cell cycle. Due to this dense structure, these areas are generally transcriptionally inactive, meaning the genes within them are not expressed. This contrasts with euchromatin, which is less condensed and contains actively transcribed genes. Heterochromatin plays a vital role in maintaining chromosome structural integrity and gene regulation.

34. (1) A-ii, B-iv, C-iii, D-i
Chromosome Classification by Centromere Position

1. Metacentric chromosomes possess a centrally located centromere resulting in equal arm lengths.
2. Sub-metacentric types have a centromere slightly offset from the center.
3. Acrocentric chromosomes feature a centromere near one end.
4. Telocentric varieties have the centromere at the very tip, defining the physical shape of the chromosome during cellular division.

35. (2) IV only
In human genetics, a normal female karyotype is designated as forty-six, XX, while a male is forty-six, XY. The Y chromosome is physically smaller than the X. Telomeres provide essential protection at chromosomal ends, and kinetochores are necessary for spindle attachment. Histone proteins facilitate DNA packaging. Therefore, identifying a female as having an XY configuration is factually incorrect.

Click Here to Buy book on Amazon

blood cells into a rigid sickle shape, which leads to various complications.

54. (1) Point mutation in DNA - Altered mRNA - Altered amino acid sequence - Polymerization of haemoglobin under low oxygen - RBC shape changes
The development of sickle cell anemia begins with a point mutation in the DNA, which is then transcribed into an altered mRNA codon. This results in the substitution of valine for glutamic acid in the hemoglobin protein. In low oxygen environments, these mutant hemoglobin molecules aggregate and polymerize. This internal structural change forces the red blood cell to transform from a disc to a sickle shape.

55. (1) X-linked recessive trait
Haemophilia is a genetic disorder that impairs the bodys ability to make blood clots, a process needed to stop bleeding. It is inherited as an X-linked recessive trait. This means the gene is located on the X chromosome. Because males have only one X chromosome, they are more frequently affected, while females are usually asymptomatic carriers unless they inherit two copies of the defective gene.

56. (2) It only affects male children.
Down syndrome is an autosomal chromosomal disorder caused by trisomy 21, meaning it can affect both male and female children equally. It is not a sex-linked condition. The disorder typically results from nondisjunction during meiosis, leads to a total of forty-seven chromosomes in somatic cells, and is characterized by physical features such as a broad flat face and a prominent furrowed tongue.

57. (3) Klinefelters syndrome - 47, XXY
Klinefelters syndrome is a genetic condition that occurs when a male is born with an extra copy of the X chromosome, resulting in a 47, XXY karyotype. Turners syndrome is 45, X0 (monosomy X). Sickle cell anemia is an autosomal recessive disorder, not X-linked. Hemophilia is an X-linked recessive disorder, whereas Trisomy 13 is known as Patau syndrome, highlighting the distinct nature of these disorders.

NODIA

58. (2) Malaria
Individuals who are heterozygous for the sickle cell allele possess a significant survival advantage in regions where malaria is endemic. The presence of the sickle hemoglobin makes their red blood cells less hospitable to the Plasmodium parasite. This phenomenon, known as heterozygote advantage, explains why the sickle cell gene remains prevalent in certain populations despite the severity of the homozygous disease.

59. (3) Nondisjunction
Nondisjunction is the failure of homologous chromosomes or sister chromatids to separate properly during cell division, specifically during meiosis I or II. This error leads to gametes with an abnormal number of chromosomes, either too many or too few. When such a gamete participates in fertilization, it results in aneuploid conditions such as Down syndrome (trisomy) or Turners syndrome (monosomy).

60. (4) 50%
A carrier woman has one normal X chromosome and one X chromosome with the haemophilia allele. A normal man has XY. Their sons receive a Y from the father and either the normal X or the Xh from the mother. Therefore, there is a fifty percent chance that a son will inherit the Xh chromosome and have haemophilia. The daughters would be either normal or carriers.

61. (3) Deoxyribonucleic acid (DNA)
Genetic engineering is a field of biotechnology that primarily involves the direct manipulation of an organisms deoxyribonucleic acid (DNA). By using molecular tools to cut, copy, and move specific segments of DNA, scientists can alter the genetic makeup of cells and organisms. This allows for the introduction of new traits, the removal of undesirable ones, or the mass production of essential biological products.

62. (2) I, II and IV
Recombinant DNA technology involves combining DNA fragments from different sources to create a new genetic sequence. A host organism, such as E. coli, is essential for cloning and multiplying this DNA. The first successful recombinant DNA was created by Cohen and Boyer. Vectors, like plasmids or viruses, are critically required for the transfer of the

45. (3) Nonsense mutation
A nonsense mutation is a specific type of point mutation where a single base substitution changes a codon that codes for an amino acid into a premature stop codon. This leads to the early termination of protein synthesis during translation, resulting in a truncated and usually non-functional polypeptide. Such mutations often have significant biological consequences depending on their location within the gene sequence.

46. (2) Inversion
An inversion is a chromosomal rearrangement in which a segment of a chromosome breaks off, flips 180 degrees, and reattaches in the reverse orientation. While the total amount of genetic material may remain the same, the change in the order of genes can interfere with proper pairing during meiosis or affect gene regulation. This structural change is a significant source of chromosomal variation.

47. (4) Mutations resulting from exposure to external chemical agents
Induced mutations are genetic changes that occur as a direct result of exposure to external environmental factors, known as mutagens. These factors can be chemical agents, such as base analogs or alkylating agents, or physical agents like X-rays and ultraviolet radiation. This distinguishes them from spontaneous mutations, which arise naturally during biological processes like DNA replication without any specific external influence or intervention.

48. (1) Most random mutations are beneficial to the organism.
Most random mutations are either neutral, having no effect, or deleterious, causing harm to the organisms fitness or function. Beneficial mutations that provide an adaptive advantage are relatively rare in nature. Other statements are accurate: mutations are indeed the ultimate source of all genetic variation, can occur spontaneously, and somatic mutations generally affect only the individual rather than being passed to offspring.

49. (3) Translocation
Translocation is a type of chromosomal abnormality where a segment from one chromosome breaks off and attaches to a non-homologous chromosome. This is distinct from crossing over, which involves the exchange of segments between homologous chromosomes. Translocations can be reciprocal, where two chromosomes swap segments, or non-reciprocal. Such rearrangements can lead to serious health issues or reduced fertility by disrupting gene function.

NODIA

50. (1) Single amino acid substitution within the protein sequence
A missense mutation is a point mutation in which a single nucleotide change results in a codon that codes for a different amino acid than the original. This substitution can alter the proteins shape, stability, or enzymatic activity, potentially leading to disease. For instance, the mutation causing sickle cell anemia is a missense mutation where glutamic acid is replaced by valine.

51. (4) Chromosome 21
Down syndrome, also known as Trisomy 21, is a genetic disorder caused by the presence of all or part of a third copy of chromosome 21. This extra genetic material alters the course of development and causes the characteristic physical and intellectual features associated with the condition. It is typically the result of nondisjunction during the process of meiosis in one of the parents.

52. (1) A-ii, B-i, C-iv, D-iii
Overview of Human Genetic Disorders
P. Sickle cell anemia is caused by a specific point mutation in the beta-globin chain.
Q. Haemophilia is an X-linked recessive disorder that inhibits proper blood clotting.
R. Down syndrome arises from the trisomy of chromosome twenty-one.
S. Turners syndrome involves the absence of one X chromosome in females, resulting in forty-five total chromosomes.

53. (3) Valine
In sickle cell anemia, a specific point mutation occurs in the HBB gene encoding the beta-globin chain of hemoglobin. At the sixth position of the polypeptide chain, the amino acid glutamic acid is replaced by valine. This single substitution causes the hemoglobin molecules to polymerize under low oxygen conditions, distorting the red

ANSWERS

1. (2) Adenine
Purines are nitrogenous bases containing a double-ring structure consisting of a six-membered ring fused to a five-membered ring. In the DNA double helix, the two primary purines are adenine and guanine. Adenine pairs specifically with the pyrimidine thymine through hydrogen bonding, ensuring the structural stability and consistent diameter of the genetic material across various biological organisms.

2. (2) Two
The Watson-Crick model describes the specific base-pairing rules that stabilize the double helix structure. In this molecular arrangement, adenine forms exactly two hydrogen bonds with thymine to ensure complementary pairing. This specific interaction maintains the uniform width of the DNA molecule while allowing for the efficient storage and replication of genetic information during cellular division processes.

3. (3) Nucleotide
A nucleotide serves as the primary structural building block of the deoxyribonucleic acid molecule. Each individual unit consists of three distinct components: a pentose sugar called deoxyribose, a phosphate group, and one of four nitrogenous bases. These units link together via phosphodiester bonds to form long polynucleotide chains, which encode the genetic instructions necessary for life.

4. (4) I, II and III
The B-form DNA double helix exhibits several defining structural characteristics essential for its biological function. The two strands run in opposite directions, known as an antiparallel orientation. The external backbone is composed of repeating deoxyribose sugar and phosphate units. Furthermore, the helix completes one full turn every 3.4 nanometers, accommodating approximately ten base pairs per turn.

5. (1) Both A and R are true and R is the correct explanation of A.
Heating DNA provides thermal energy that disrupts the weak hydrogen bonds holding the two complementary strands together. Because these bonds are non-covalent, they break more easily than the covalent phosphodiester backbone when exposed to high temperatures. This separation process, known as denaturation, is fundamental for molecular techniques like polymerase chain reactions and occurs naturally during DNA replication.

6. (2) Direct synthesis of lipids in the cytoplasm
DNA primarily functions as the carrier of genetic information and provides the instructions for synthesizing proteins through transcription and translation. While it controls cellular activities and replicates during division, it does not directly synthesize lipids. Lipid synthesis occurs in the cytoplasm, specifically within the smooth endoplasmic reticulum, mediated by various enzymes rather than direct DNA template instructions.

7. (1) 0.34 nm
In the standard B-DNA double helix model, the vertical distance between two adjacent nitrogenous base pairs is approximately 0.34 nanometers. This precise spacing contributes to the overall stability of the helix through base-stacking interactions. Given that one full helical turn covers 3.4 nanometers and contains ten base pairs, the calculated distance between individual steps remains remarkably consistent.

8. (1) Chargaffs Rule
Erwin Chargaff formulated the rule stating that in the DNA of any given species, the ratio of adenine to thymine is equal, as is the ratio of guanine to cytosine. This observation provided critical evidence for the base-pairing mechanism in the double helix model. These stoichiometric equalities ensure that the total purine content always equals the total pyrimidine content.

Downloaded from www.pdf.tube

rDNA into the host, making certain statements regarding their omission incorrect.

63. (1) Both Statement I and Statement II are correct.
Genetic engineering breaks biological barriers by allowing the transfer of specific genes between entirely different species, such as moving a bacterial gene into a plant. In contrast, natural sexual reproduction is generally restricted by biological compatibility, occurring only between members of the same species or very closely related ones. This fundamental difference enables biotechnology to create organisms with traits that could never arise through traditional breeding.

64. (1) Salmonella typhimurium
The first recombinant DNA molecule was constructed in 1972 by Stanley Cohen and Herbert Boyer. They successfully linked a gene encoding antibiotic resistance to a native plasmid of the bacterium Salmonella typhimurium. This pioneering experiment demonstrated that genetic material could be manipulated and functionalized in a foreign host, laying the foundation for the modern biotechnology industry.

65. (3) Gel electrophoresis
Gel electrophoresis is a fundamental technique in genetic engineering used to separate DNA fragments based on their size and charge. When an electric current is applied, the negatively charged DNA molecules migrate through a porous gel matrix toward the positive electrode. Smaller fragments move faster and further than larger ones, allowing researchers to visualize, identify, and isolate specific DNA segments for further analysis or cloning.

66. (2) The introduction of recombinant DNA into a host cell
In the context of recombinant DNA technology, transformation refers to the process by which a host cell, typically a bacterium, takes up foreign DNA from its environment. This is a crucial step in gene cloning, as it allows the recombinant vector to enter the cell where it can replicate and express the inserted gene. Various methods, such as heat shock, are used to facilitate this uptake.

67. (4) Recombinant DNA formed from material of different species
Chimeric DNA, often used synonymously with recombinant DNA, is a single DNA molecule that has been constructed in a laboratory using genetic material from two or more different biological sources or species. The name is derived from the Chimera of Greek mythology, a creature composed of parts from different animals. This molecular hybrid allows for the expression of specific foreign traits within a host organism.

68. (1) Production of gene copies or the encoded protein product
The primary objective of inserting a specific gene into a host organism is to utilize the hosts cellular machinery to either create many identical copies of that gene or to synthesize large quantities of the protein the gene encodes. This process is essential for research, the manufacturing of therapeutic drugs like insulin, and the development of genetically modified organisms with enhanced agricultural or industrial properties.

NODIA

69. (3) RNA polymerase is the primary enzyme used to synthesize cDNA from mRNA.
The enzyme used to synthesize complementary DNA from a messenger RNA template is reverse transcriptase, not RNA polymerase. RNA polymerase is actually responsible for synthesizing RNA from a DNA template during transcription. Other tools mentioned are correct: restriction enzymes act as molecular scissors, DNA ligase functions as molecular glue, and plasmids serve as essential vectors for carrying foreign genetic material into host cells.

70. (1) Facilitation of DNA entry by enhancing cell competence
During the transformation process, bacteria are treated with a high concentration of calcium chloride to increase their competence, or their ability to take up foreign DNA. The divalent calcium ions are thought to neutralize the negative charges on both the DNA and the bacterial cell membrane, making it easier for the recombinant DNA to pass through the cell wall during a subsequent heat shock.

for medical use and commercially produced. Introduced in 1982, it was created by inserting the human gene for insulin into the bacterium E. coli. This breakthrough provided a safer and more reliable source of insulin for diabetic patients compared to traditional animal-derived sources.

142. (1) A-ii, B-iii, C-iv, D-i
Medical Applications of Biotechnology Products
1. Tissue Plasminogen Activator dissolves blood clots in stroke patients.
2. Erythropoietin stimulates red blood cell production in cases of anemia.
3. Interferons provide antiviral and anticancer benefits by modulating the immune response.
4. Humulin is utilized for managing diabetes mellitus, showcasing the significant impact of recombinant DNA technology in modern medicine.

143. (3) I, II and III
Recombinant insulin is produced by inserting human genes into E. coli. To ensure proper structure, the A and B chains are synthesized separately and subsequently linked by disulfide bonds. Eli Lilly pioneered its production in 1983. However, recombinant human insulin is chemically identical to natural human insulin and is actually much less likely to cause allergic reactions than animal-derived alternatives.

144. (4) Adenosine Deaminase (ADA) deficiency
The first successful clinical trial of gene therapy was performed in 1990 on a four-year-old girl named Ashanti DeSilva. She suffered from a rare genetic disorder called Severe Combined Immunodeficiency caused by a deficiency of the enzyme Adenosine Deaminase. In the treatment, her own white blood cells were extracted, genetically corrected with a functional ADA gene, and then reinfused to restore function.

145. (1) Yeast cells genetically engineered to produce the viral surface antigen
The modern Hepatitis B vaccine is a recombinant subunit vaccine produced using genetic engineering. The gene for the viruss surface antigen is inserted into common bakers yeast. The yeast cells then produce large quantities of the viral protein, which is harvested and purified for use. Because it only contains a single viral protein and not the whole virus, it is extremely safe.

146. (2) Large-scale production and modification to combat bacteria
Genetically engineered antibiotics offer the advantage of being produced more efficiently and on a larger scale using optimized microbial hosts. Furthermore, biotechnology allows scientists to specifically modify the structure of existing antibiotics to overcome bacterial resistance mechanisms. While they do not provide complete immunity to resistance, they give researchers a powerful tool to rapidly develop and manufacture new antimicrobial agents.

147. (2) Monoclonal antibodies
Hybridoma technology is a specialized technique used to produce large quantities of identical, highly specific antibodies called monoclonal antibodies. This involves fusing a specific antibody-producing cell with a cancerous cell. The resulting hybridoma cell possesses both the antibody specificity and the immortal growth characteristic, allowing for the continuous production of the specific antibody in the laboratory for various medical diagnostic applications.

148. (1) Germline gene therapy is widely practiced globally and is free from ethical restrictions.
Germline gene therapy, which involves modifying the DNA of eggs, sperm, or embryos, is not widely practiced and is actually banned or strictly regulated in most countries due to major ethical and safety concerns. Other statements are correct: gene therapy involves replacing defective genes with functional ones; viral vectors are common delivery tools; and somatic therapy only affects the individual.

149. (3) Pharmacogenomics
Pharmacogenomics is the branch of science that studies how an individuals unique genetic makeup influences their response to drugs. By analyzing a patients DNA, doctors can predict which medications will be most effective and what the optimal dosage should be, while also identifying potential risks for adverse side effects. This approach is a key component of personalized medicine and modern healthcare.

Click Here to Buy book on Amazon

ligase is a standard tool used in biotechnology laboratories worldwide today.

80. (1) Digestion of invading viral DNA to prevent cell infection
In their natural bacterial environment, restriction endonucleases function as a sophisticated defense system against invading viruses known as bacteriophages. When a virus injects its DNA into the bacterium, these enzymes recognize specific sequences in the viral genome and cut it into non-functional pieces. The bacteriums own DNA is protected from this digestion through chemical modifications like methylation, which masks the recognition sites.

81. (3) Kary Mullis
The Polymerase Chain Reaction technique was developed by Kary Mullis in 1983. This groundbreaking invention revolutionized molecular biology by allowing scientists to amplify specific DNA sequences millions of times in a very short period. For this contribution, Mullis was awarded the Nobel Prize in Chemistry in 1993. PCR is now a standard tool in diagnostics, forensics, and all areas of genetic research worldwide.

82. (1) B, C, A
A single cycle of the Polymerase Chain Reaction consists of three distinct temperature-dependent steps in a specific order. First is denaturation, where the double-stranded DNA is heated to separate into single strands. Second is annealing, where the temperature is lowered to allow primers to bind to the target. Finally, extension occurs, where the DNA polymerase synthesizes new strands by extending from the primers.

83. (1) Both A and R are true and R is the correct explanation of A.
Taq polymerase is indispensable for PCR because it is derived from a thermophilic bacterium and can withstand high temperatures. Standard DNA polymerases would be permanently denatured and inactivated during the 95°C step required to separate DNA strands. The thermostability of Taq allows the enzyme to remain functional throughout multiple cycles of heating and cooling, enabling the automated amplification of the target DNA sequence.

84. (1) Thermus aquaticus
Taq polymerase is isolated from the bacterium Thermus aquaticus, which was originally discovered in the hot springs of Yellowstone National Park. Because this organism thrives in extremely high-temperature environments, its enzymes have evolved to remain stable and active even at temperatures near boiling. This unique property made it the ideal enzyme for automating the PCR process, which requires repeated heating steps to denature DNA.

85. (3) 94-96 C
During the denaturation step of a PCR cycle, the reaction mixture is typically heated to a temperature between 94°C and 96°C. This intense heat provides the energy required to break the hydrogen bonds between the complementary nitrogenous bases of the double-stranded DNA template. As a result, the two strands separate completely, providing the necessary single-stranded templates for the primers to bind in the subsequent annealing step.

86. (2) Provision of a starting point for the polymerase enzyme
DNA polymerases cannot initiate the synthesis of a new DNA strand from scratch; they require a pre-existing 3-hydroxyl group to add nucleotides. In PCR, short, synthetic oligonucleotide primers provide this essential starting point. These primers are designed to be complementary to the sequences flanking the target DNA region, ensuring that the polymerase only amplifies the specific segment of interest during the extension phase.

NODIA

87. (4) Over 1 billion copies
PCR is an exponential amplification process. In each cycle, the number of target DNA molecules doubles. The formula for calculating the number of copies is 2 to the power of n, where n is the number of cycles. After thirty cycles, a single starting molecule of DNA is amplified 2 to the power of thirty times, which results in over one billion identical copies.

88. (1) Large-scale protein synthesis within the amplification
PCR is exclusively a technique for amplifying DNA sequences; it does not involve the cellular machinery necessary for protein synthesis. While

PCR can be used to prepare DNA for later protein production in a host cell, the PCR reaction itself does not produce proteins. Standard applications include forensic DNA profiling, medical diagnosis of pathogens, and the study of ancient or degraded DNA from fossils.

89. (3) It requires the presence of DNA ligase.
The annealing step of PCR does not require DNA ligase. Instead, it relies on the lowering of temperature to allow primers to form hydrogen bonds with their complementary sequences on the single-stranded template. DNA polymerase, not ligase, then extends these primers. Ligase is used in different biotechnological processes to join DNA fragments but is not a component of the standard PCR reaction mixture.

90. (1) Automating the temperature changes required for PCR
A thermocycler, also known as a PCR machine, is a specialized laboratory instrument designed to automatically cycle through the precise temperature changes required for the denaturation, annealing, and extension steps of the Polymerase Chain Reaction. By accurately and rapidly heating and cooling the reaction tubes, the device allows for the efficient and repeated amplification of DNA sequences without the need for manual intervention.

91. (4) Plasmids
Plasmids are small, circular, double-stranded DNA molecules found in many bacteria, separate from the main chromosomal DNA. They are capable of self-replication and often carry genes that provide a survival advantage, such as antibiotic resistance. Because they are easy to isolate and manipulate, plasmids are the most commonly used vectors in genetic engineering for carrying and cloning foreign DNA segments in host cells.

92. (1) A-ii, B-iii, C-i, D-iv
Functional Components of Cloning Vectors
1. The origin of replication initiates DNA synthesis.
2. Selectable markers identify successfully transformed cells.
3. The multiple cloning site contains various restriction enzyme recognition sequences for gene insertion.
4. Promoters are essential for the transcription of the inserted gene within the host cell, ensuring the production of the desired biological product during the final stages of the cloning process.

93. (3) I and III only
pBR322 was indeed one of the first widely used artificial plasmid vectors. Selectable markers are essential for distinguishing between host cells that contain the recombinant plasmid and those that do not. However, plasmids have a limited capacity for the size of the foreign DNA they can carry; very large fragments require different vectors like BACs or YACs, making certain statements regarding their capacity incorrect.

94. (1) Selectable marker
In the plasmid pBR322, the ampicillin resistance gene functions as a selectable marker. When bacteria are grown on a medium containing the antibiotic ampicillin, only those cells that have successfully taken up the plasmid will be able to survive and form colonies. This allows researchers to easily identify and isolate the transformed bacteria from the vast majority of cells that did not receive the plasmid.

95. (3) Insertional inactivation
Insertional inactivation is a technique used to identify recombinant clones. When a foreign DNA fragment is inserted into the coding sequence of a reporter gene, it disrupts the genes function. For example, if the lacZ gene is inactivated, the bacteria will no longer be able to produce the enzyme beta-galactosidase, resulting in white colonies instead of blue on specific media, signaling a successful insertion.

96. (2) Ti plasmid of Agrobacterium tumefaciens
The Ti plasmid of the soil bacterium Agrobacterium tumefaciens is the most widely used vector for genetic engineering in dicotyledonous plants. In nature, this bacterium transfers a segment of its Ti plasmid into the plant genome. Scientists have disarmed this plasmid by removing the disease-causing genes and replacing them with genes of interest, effectively turning the bacterium into a natural gene delivery system.

Downloaded from www.pdf.tube

97. (4) Electroporation or microinjection
Introducing recombinant DNA into animal cells requires different methods than bacterial transformation. Microinjection involves using a very fine glass needle to inject DNA directly into the nucleus of a cell or embryo. Electroporation uses brief pulses of high-voltage electricity to create temporary pores in the cell membrane, allowing the DNA to enter. Other methods include using viral vectors or lipid-based carriers.

98. (1) Bacteriophages cannot be used as cloning vectors.
Bacteriophages are viruses that infect bacteria, and they are extensively used as cloning vectors because they can naturally inject their DNA into host cells and accommodate larger DNA inserts than standard plasmids. Other statements are correct: high copy numbers increase yield; YACs and BACs are specialized for very large genomic fragments; and expression vectors are designed with regulatory sequences needed to produce proteins.

99. (3) Prevention of vector fragmentation during cloning steps
A cloning vector should ideally have only one recognition site for a particular restriction enzyme. If multiple sites were present, the enzyme would cut the vector into several fragments, making it difficult to reassemble and significantly complicating the process of inserting the foreign gene. Having a single site ensures that the circular vector is linearized at a specific point, allowing foreign DNA integration.

100. (1) Create multiple exact copies of a specific DNA segment
The fundamental goal of gene cloning is to isolate a specific DNA sequence and produce many identical copies of it. This allows scientists to obtain enough material to study the genes structure, sequence, and function, or to use the cloned DNA for practical applications like gene therapy, the creation of transgenic organisms, or the industrial-scale production of valuable proteins like hormones.

101. (4) Expression of foreign genetic material via recombinant DNA
Transgenic organisms, also known as Genetically Modified Organisms, are individuals whose genome has been altered by the introduction of one or more foreign DNA sequences from another species. This is achieved through recombinant DNA technology. These transgenes are integrated into the hosts genome and can be passed on to future generations, allowing the organism to express new traits or produce foreign proteins.

102. (1) A-ii, B-iv, C-i, D-iii
Characteristics of Genetically Modified Crops
A. Bt Cotton provides resistance against bollworms.
B. Golden Rice is biofortified with Vitamin A precursors.
C. Flavr Savr Tomato was engineered for delayed ripening.
D. GM Mustard DMH-eleven exhibits herbicide tolerance.
These traits illustrate how biotechnology can enhance agricultural productivity, nutritional value, and shelf life of food through targeted genetic modifications across different biological species.

NODIA

103. (4) I, II, III and IV
Bt cotton is a transgenic variety containing cry genes from Bacillus thuringiensis. The plant produces the Bt toxin in an inactive protoxin form, which is harmless to the plant and humans. However, when an insect consumes the plant tissue, the alkaline pH of its gut activates the toxin, leading to pore formation and death. This crop is currently commercially cultivated in India.

104. (2) Beta-carotene
Golden Rice is a variety of rice produced through genetic engineering to biosynthesize beta-carotene, which the human body converts into Vitamin A. This crop was developed as a humanitarian tool to combat Vitamin A deficiency, a major cause of blindness and health issues in developing countries where rice is a staple food. The name comes from the characteristic yellow-orange color of grains.

105. (3) The toxin exists as an inactive protoxin crystal inside the bacterium.
Bacillus thuringiensis does not suffer from its own toxin because the protein is synthesized and stored as an inactive, crystalline protoxin. The toxin only becomes active and lethal when it is

ingested by a susceptible insect and exposed to the specific alkaline environment of the insects midgut. This natural safety mechanism ensures that the bacterium can produce the protein without causing self-destruction.

106. (2) The potential for gene flow to wild relatives, creating superweeds
A significant environmental concern regarding GM crops is the possibility of gene flow, where pollen from the modified crop fertilizes related wild plants or weeds. If the transgene is transferred, it could create superweeds that are difficult to control. This potential for unintended ecological consequences requires careful monitoring and regulation of the release and cultivation of genetically modified organisms in the environment.

107. (4) Transgenic animals cannot be used for chemical safety testing.
Transgenic animals are specifically designed and extensively used for chemical and drug safety testing. They can be engineered to be more sensitive to toxic substances, allowing for faster and more accurate results than traditional animal models. Other statements are correct: they are used for vaccine safety, studying human diseases like Alzheimers, and the first transgenic cow, Rosie, produced human protein-enriched milk.

108. (1) Breeding crops to increase their nutritional value.
Biofortification is the process of increasing the nutritional quality of food crops through agronomic practices, conventional plant breeding, or modern biotechnology. Unlike traditional fortification, which adds nutrients during food processing, biofortification aims to make the plants themselves richer in essential vitamins and minerals while they are growing, providing a sustainable way to improve public health in nutrient-deficient populations worldwide.

109. (3) Alkaline pH
The activation of the Bt toxin is highly specific to the environment of the target insects gut. The inactive protoxin crystals ingested by the insect are solubilized and proteolytically cleaved into an active form only when they encounter the alkaline pH conditions found in the midgut. This active toxin then binds to specific receptors on the gut lining, causing cell lysis and death.

110. (1) Flavr Savr Tomato
The Flavr Savr tomato, developed by Calgene and released in 1994, was the first genetically modified food crop to be granted a license for commercial sale and human consumption. It was engineered to have a longer shelf life and resist rotting by silencing the gene responsible for fruit softening. Although it was later withdrawn from the market, it paved the way for future GMOs.

111. (2) 1990
The Human Genome Project was an international scientific research project officially launched in October 1990. Its monumental goal was to determine the base pairs that make up human DNA and to identify and map all the genes of the human genome from both a physical and functional standpoint. This multi-billion dollar mega-project involved scientists from around the world and was publicly funded.

112. (4) I, II, III, IV and V
The Human Genome Project was a public mega-project that successfully sequenced the 3 billion base pairs of the human genome. Major findings included that humans have approximately 20,000 to 25,000 genes, and that less than 2% of the entire genome actually codes for proteins. The project also directly led to the birth of bioinformatics, the field dedicated to managing genomic research data.

113. (1) Isolation of DNA - Fragmentation - Cloning into vectors - Sequencing - Computer-based assembly
The Whole Genome Shotgun approach involves several logical steps. First, the total DNA is isolated from the cell. Then, it is broken into smaller fragments. These fragments are cloned into vectors to create a genomic library. Each fragment is then sequenced using automated sequencers. Finally, powerful computer algorithms are used to align overlapping sequences and assemble them into the complete genome sequence.

114. (2) 20,000 - 25,000
One of the most surprising discoveries of the Human Genome Project was that the human genome contains far fewer genes than previously

Click Here to Buy book on Amazon

estimated. Before the project, many scientists predicted upwards of 100,000 genes. However, the final analysis revealed that humans have approximately 20,000 to 25,000 protein-coding genes. This finding suggested that human biological complexity arises more from gene regulation than numbers.

115. (1) Chromosome 1
Chromosome 1 is the largest human chromosome, containing approximately 3,000 genes. Due to its sheer size and complexity, it was the last chromosome to be completely sequenced as part of the Human Genome Project. The finished sequence of Chromosome 1 was officially published in May 2006, marking the final milestone in the primary sequencing phase of the thirteen-year long international effort.

116. (2) Single Nucleotide Polymorphism
A Single Nucleotide Polymorphism is a variation at a single position in a DNA sequence among individuals. It is the most common type of genetic variation in humans. For example, at a specific location, some individuals may have the base Cytosine, while others have Thymine. SNPs occur throughout the genome and are used as molecular markers to track inheritance and disease.

117. (2) Bioinformatics
Bioinformatics is an interdisciplinary field that developed out of the necessity to handle the massive amounts of data produced by the Human Genome Project. It combines biology, computer science, and statistics to develop tools for storing, retrieving, and analyzing complex biological information. This field is now essential for modern genomics, drug discovery, and personalized medicine, allowing researchers to analyze large-scale genetic datasets.

118. (1) Cloning a human being
The Human Genome Project was strictly focused on mapping and sequencing the human genome and identifying its genes; cloning human beings was never a goal and was widely prohibited by ethical guidelines. The primary objectives included identifying all genes, determining the sequence of 3 billion base pairs, and addressing the Ethical, Legal, and Social Issues arising from the availability of genomic information.

119. (3) Over 50% of the discovered genes have known, specific functions.
Contrary to what might be expected, the function of more than 50% of the genes discovered during the Human Genome Project was unknown at the time of the projects completion. The other statements are correct: Chromosome 1 has the most genes, the Y chromosome has the fewest, and humans are over 99.9% genetically identical at the nucleotide level across all diverse populations.

120. (4) Contribution to understanding the chromosome structure
Repetitive sequences, which do not code for proteins, make up a very large portion of the human genome. While they were once dismissed as junk DNA, research has shown that they play critical roles in maintaining chromosome structure, dynamics, and stability. They provide essential information for chromosome folding and organization within the nucleus and may also be involved in regulating gene expression.

121. (3) Targeted and precise gene editing
CRISPR-Cas9 is a revolutionary tool that allows scientists to make highly specific and precise changes to the DNA of living organisms. Often described as molecular scissors, it can be programmed to find a specific genetic sequence and cut it, allowing for genes to be removed or new sequences to be added. This technology has transformed genetic research and offers potential future cures.

122. (1) A-ii, B-iii, C-i, D-iv
Essential Components of CRISPR Systems
A. Cas9 functions as the molecular scissors for cutting DNA.
B. Guide RNA directs the enzyme to the specific target.
C. The PAM sequence is required for initial Cas9 binding.
D. The target DNA is the actual site of modification.

These elements work together to enable precise and efficient genome editing across various biological organisms in modern biotechnology.

Downloaded from www.pdf.tube

123. (1) Both A and R are true and R is the correct explanation of A.
CRISPR-Cas9 was not originally an artificial invention but was discovered as a natural adaptive immune system in bacteria and archaea. Bacteria use CRISPR sequences to store fragments of DNA from viruses that have previously attacked them. If the same virus invades again, the Cas9 enzyme uses the stored RNA memory to recognize and cut the viral DNA, effectively neutralizing the threat.

124. (1) Emmanuelle Charpentier and Jennifer Doudna
Emmanuelle Charpentier and Jennifer Doudna were awarded the Nobel Prize in Chemistry in 2020 for their pioneering work in developing the CRISPR-Cas9 gene-editing method. They showed that the bacterial defense system could be repurposed into a versatile and programmable tool for editing any DNA sequence in any organism. Their discovery has had an immense impact on life sciences and medicine.

125. (4) Repeats
CRISPR stands for Clustered Regularly Interspaced Short Palindromic Repeats. The R stands for Repeats, referring to the identical, short sequences of DNA that are repeated at regular intervals within the bacterial genome. These repeats are separated by spacer DNA derived from past viral invaders. This structural organization is the hallmark of this microbial immune system and provides the basis for targeting.

126. (2) Curing genetic diseases by correcting mutations
The most promising medical application of CRISPR-Cas9 technology is the potential to treat and even cure inherited genetic disorders by directly correcting the underlying mutations. By targeting the defective gene in a patients cells and replacing it with a healthy sequence, CRISPR could offer permanent solutions for conditions like sickle cell anemia and cystic fibrosis, which currently have limited treatment options.

127. (4) It requires no guide sequence and randomly cuts DNA.
The defining feature of CRISPR-Cas9 is that it is highly specific and programmable, not random. It absolutely requires a guide RNA sequence to direct the Cas9 enzyme to a specific location in the genome. Without the guide, the enzyme cannot find the target. Other statements are correct: it can knock out genes, knock in new material, and it works in eukaryotic cells.

128. (1) The cell's natural DNA repair mechanisms try to fix the break.
Once the Cas9 enzyme creates a double-strand break in the target DNA, the cells internal repair machinery is immediately activated to fix the damage. Scientists exploit these natural processes to edit the genome. One pathway often introduces small errors, effectively disabling the gene, while another pathway can use a provided DNA template to precisely insert a new sequence at the break site.

129. (3) Cas9 cutting DNA at unintended sites with similar sequences
A major challenge in CRISPR technology is the occurrence of off-target effects, which happen when the Cas9 enzyme binds to and cuts DNA at locations other than the intended target. This occurs because the guide RNA may accidentally recognize sequences that are very similar to the target site. These unintended cuts can lead to harmful mutations elsewhere in the genome, raising safety concerns.

130. (4) Promoting universal inheritance of a genetic alteration
A gene drive is a sophisticated application of CRISPR that ensures a specific genetic modification is passed on to nearly all offspring, bypassing traditional inheritance. This allows the modification to spread rapidly through an entire wild population. While it could be used to eliminate disease-carrying mosquitoes, it raises significant ethical and ecological concerns due to its potential to permanently alter entire ecosystems.

131. (2) Totipotent
Totipotent stem cells possess the highest level of differentiation potential. A single totipotent cell, such as a zygote or cells from the very first few divisions, has the extraordinary ability to differentiate into any cell type in the body as well as the extra-embryonic tissues like the placenta. Consequently, these cells have the capacity to develop into a complete, independent organism.

NODIA

132. (1) Both Statement I and Statement II are correct.
Adult stem cells are multipotent, meaning they are typically restricted to becoming cell types within their specific tissue of origin, such as blood stem cells only making blood cells. In contrast, embryonic stem cells are pluripotent; they are derived from the blastocyst and have the broader capability to differentiate into any of the more than 200 specialized cell types in the body.

133. (1) I and II only
Induced Pluripotent Stem Cells are created by genetically reprogramming specialized adult cells, like skin cells, back into an embryonic-like state. This breakthrough allows for the creation of pluripotent cells without using or destroying embryos, thus avoiding major ethical controversies. However, iPSCs are pluripotent and can potentially differentiate into almost any cell type in the body, which makes certain specialized restrictions incorrect.

134. (4) Hematopoietic stem cells
Bone marrow transplantation is a well-established medical procedure that primarily utilizes hematopoietic stem cells. These are multipotent adult stem cells found in the bone marrow that have the ability to give rise to all different types of blood cells, including red and white blood cells. This therapy is commonly used to treat patients with various blood-related disorders, such as leukemia and anemia.

135. (2) Regenerative medicine
Regenerative medicine is a specialized field of medicine focused on repairing, replacing, or regenerating human cells, tissues, or organs to restore normal function. This often involves using stem cells to create new, healthy tissue that can be transplanted into patients to replace parts damaged by disease, injury, or aging. Examples include growing skin for burn victims or potentially regenerating heart muscle.

136. (1) It requires the destruction of early-stage human embryos.
The most prominent and unique ethical challenge associated with human embryonic stem cell research is that the process of isolating these cells currently necessitates the destruction of a five-day-old human embryo. This raises profound moral and religious questions for many people regarding the status of the embryo and the ethics of destroying potential human life, a concern not shared with adult stem cells.

137. (3) Inner cell mass of blastocyst - Pluripotent
The inner cell mass of a blastocyst contains pluripotent stem cells, which can become any cell type in the body. A zygote is actually totipotent, not multipotent. Mesenchymal stem cells are multipotent, as they can form bone, cartilage, and fat, but not a whole organism. Skin stem cells are also multipotent, restricted to regenerating skin-related tissues in various biological organisms.

138. (2) Shinya Yamanaka
Shinya Yamanaka was awarded the Nobel Prize in Physiology or Medicine in 2012 for his groundbreaking discovery that mature, specialized cells can be reprogrammed to become pluripotent stem cells. By introducing four specific genes into adult skin cells, he showed it was possible to turn back the developmental clock, creating cells nearly identical to embryonic stem cells. This technology has revolutionized medicine.

139. (4) Correction of chromosomal abnormalities in adult patients.
While stem cells can regenerate tissues and replace lost cells, such as dopamine neurons in Parkinsons or heart muscle after a heart attack, they cannot correct inherent chromosomal abnormalities in the existing cells of an adult patient. Chromosomal defects are part of the fundamental genetic makeup of all cells in the individual. Stem cell therapy focus is on replacing functional units rather than genome rewriting.

140. (1) Hematopoietic stem cells
Cord blood, which is the blood remaining in the umbilical cord and placenta after a baby is born, is a rich and valuable source of hematopoietic stem cells. Like the stem cells found in bone marrow, these cells have the ability to differentiate into all types of blood cells. Many parents choose to bank their childs cord blood for future therapeutic medical use.

141. (3) Insulin (Humulin)
Recombinant human insulin, marketed under the name Humulin, was the first genetically engineered human hormone to be approved

Click Here to Buy book on Amazon

71. (4) Cleavage of DNA at specific internal recognition sites
Restriction endonucleases are specialized enzymes that recognize specific, usually palindromic, sequences of nucleotides within a DNA molecule. Upon finding these recognition sites, the enzymes cleave the sugar-phosphate backbone at precise internal locations. This ability to cut DNA at predictable and specific sites is the cornerstone of recombinant DNA technology, enabling the isolation and manipulation of particular genes or DNA fragments.

72. (1) A-ii, B-i, C-iv, D-iii
Different enzymes perform specific tasks in biotechnology. Restriction endonucleases cut DNA at palindromic sequences. DNA ligase joins DNA fragments by forming phosphodiester bonds. DNA polymerase is used to synthesize new DNA strands by adding nucleotides to a primer. Reverse transcriptase is essential for creating complementary DNA from an RNA template, which is a key step in cloning eukaryotic genes from messenger RNA.

73. (2) I, III and IV
Restriction enzymes are bacterial defense tools against viral infections. DNA ligase is an ATP-dependent enzyme that catalyzes the formation of bonds between DNA fragments. Palindromic sequences read the same in the 5 to 3 direction on both strands. However, EcoRI produces sticky ends, not blunt ends, and DNA ligase is indeed capable of joining blunt-ended fragments, although the process is generally less efficient.

74. (2) Coli
The nomenclature of restriction enzymes follows a specific system based on the source organism. In the case of EcoRI, the E stands for the genus Escherichia, and the co stands for the species coli. The R represents the specific strain, and the Roman numeral I indicates that it was the first enzyme isolated from that particular strain. This systematic naming allows scientists to identify origins.

75. (3) Palindromic sequences
Restriction endonucleases typically recognize palindromic sequences in the DNA. A molecular palindrome is a sequence of base pairs that reads the same on both strands when the orientation is kept the same. These symmetrical sequences allow the enzyme, which often functions as a dimer, to bind and cut both strands of the double helix at specific, mirrored locations, enabling precise genetic engineering applications.

76. (4) Phosphodiester bond
DNA ligase is the enzyme responsible for permanently joining two DNA fragments by catalyzing the formation of a covalent phosphodiester bond. This bond occurs between the 3-hydroxyl group of one nucleotide and the 5-phosphate group of another. This reaction effectively seals the nicks in the sugar-phosphate backbone of the double helix, resulting in a continuous and stable recombinant DNA molecule for further applications.

77. (3) SmaI
Most commonly used restriction enzymes, such as EcoRI, BamHI, and HindIII, cut the DNA strands at staggered positions within the recognition site, creating short, single-stranded overhanging sticky ends. However, some enzymes like SmaI cut both strands of the DNA at the same central position. This results in blunt ends which do not have overhanging sequences. Blunt-ended fragments are generally more difficult to ligate efficiently.

78. (2) Sticky ends
Sticky ends are short, single-stranded overhanging sequences of DNA produced when certain restriction endonucleases cut the double helix in a staggered fashion. These ends are called sticky because they can easily form complementary hydrogen bonds with other DNA fragments cut by the same enzyme. This temporary base-pairing significantly facilitates the subsequent action of DNA ligase, making the cloning process much more efficient and reliable.

79. (4) It can synthesize DNA de novo without a template.
DNA ligase is a sealing enzyme that joins existing fragments; it cannot synthesize a new DNA strand from scratch without a template. That function is performed by DNA polymerases. Other statements are correct: ligase is essential for both replication and cloning, it joins Okazaki fragments on the lagging strand, and T4 DNA

NODIA

150. (4) Random genomic integration triggering oncogenic changes
A significant risk associated with using retroviral vectors in gene therapy is insertional mutagenesis. Retroviruses work by integrating their genetic material directly into the host cells DNA. However, this integration happens randomly. If the vector accidentally inserts itself into or near a gene that controls cell growth, it could disrupt that genes function and potentially trigger the development of cancer in patients.

151. (2) Degrade or detoxify environmental pollutants
Bioremediation is an environmentally friendly technology that utilizes the natural metabolic processes of living organisms, primarily bacteria, fungi, and plants, to clean up contaminated soil, water, and air. These organisms break down, transform, or neutralize hazardous pollutants, such as oil, pesticides, and heavy metals, into less toxic or non-toxic substances, effectively restoring the health of the polluted environment.

152. (1) A-iii, B-i, C-ii, D-iv
Strategies for Environmental Bioremediation
1. Biostimulation adds nutrients to enhance native microbial activity.
2. Bioaugmentation introduces specialized external microbes to the site.
3. Phytoremediation utilizes plants to accumulate or detoxify pollutants.
4. Biosparging increases oxygen levels in groundwater to stimulate aerobic degradation, providing versatile biological solutions for restoring contaminated environments and protecting public health through eco-friendly technologies.

153. (1) I, II and IV
Pseudomonas putida is a famous engineered superbug used for oil spills. Bioremediation is typically cheaper and more natural than chemical methods. Phytomining is an innovative use of plants to extract metals. However, heavy metals cannot be destroyed by microbes; they can only be transformed or accumulated. Also, ex-situ bioremediation involves removing contaminated material to another location for treatment.

154. (1) Ananda Mohan Chakrabarty
Ananda Mohan Chakrabarty was a renowned Indian-American microbiologist who developed the first genetically engineered bacterium, a strain of Pseudomonas putida. He successfully combined genes from different bacteria into one superbug capable of degrading multiple components of crude oil. This work led to a landmark 1980 U.S. Supreme Court decision that allowed for the patenting of living, human-made organisms in biotechnology.

155. (3) Dependency on environmental parameters like pH and nutrients
A major limitation of bioremediation is that it relies on living organisms, which are highly sensitive to their environment. Factors such as soil pH, temperature, moisture levels, and the availability of essential nutrients must be within a specific range for the microbes to survive and effectively degrade pollutants. If these conditions are not optimal, the cleanup process can be extremely slow.

156. (4) Mycoremediation
Mycoremediation is a specific form of bioremediation that utilizes fungi to decontaminate an environment. Fungi are particularly effective because they produce powerful extracellular enzymes that can break down complex and resistant pollutants, including plastics and heavy metals. Their extensive mycelial networks can penetrate deep into soil, allowing them to reach and neutralize contaminants that might be inaccessible to bacteria.

157. (2) Bioventing
In-situ bioremediation refers to treating the contaminated material exactly where it is located, without excavating it. Bioventing is a classic in-situ technique where air and nutrients are delivered to the contaminated soil to stimulate the growth and activity of indigenous aerobic bacteria that break down organic pollutants. This contrasts with ex-situ methods like composting, which require material removal for treatment.

158. (1) Phytoextraction
Phytoextraction is a type of phytoremediation where specific plants absorb large amounts of heavy metals or other contaminants from the soil through their roots. These pollutants are then transported and stored in the plants above-ground tissues. Once the plants have grown, they

Downloaded from www.pdf.tube

life of milk.
Reason (R): Pasteurization completely destroys all bacterial spores present in the milk.
(1) Both A and R are true and R is the correct explanation of A.
(2) Both A and R are true but R is not the correct explanation of A.
(3) A is true but R is false.
(4) A is false but R is true.
(5) Question not attempted

10. The Food Safety and Standards Authority of India (FSSAI) operates under which Union Ministry?
(1) Ministry of Health and Family Welfare
(2) Ministry of Agriculture and Farmers Welfare
(3) Ministry of Consumer Affairs, Food and Public Distribution
(4) Ministry of Food Processing Industries
(5) Question not attempted

11. In the human digestive system, the majority of nutrient absorption takes place in the:
(1) Stomach
(2) Large intestine
(3) Oesophagus
(4) Small intestine
(5) Question not attempted

12. Which of the following is a characteristic of innate immunity?
(1) It is pathogen-specific.
(2) It is present from birth.
(3) It relies on memory cells.
(4) It develops after exposure to an infection.
(5) Question not attempted

13. Consider the following statements regarding vaccines:
I. Live attenuated vaccines contain a weakened form of the germ.
II. Inactivated vaccines generally provide lifelong immunity with a single dose.
III. Toxoid vaccines use a toxin made by the germ that causes a disease.
IV. mRNA vaccines teach cells how to make a protein that triggers an immune response.
Which of the above statement(s) is/are incorrect?
(1) I and III only
(2) II only
(3) III and IV only
(4) II and IV only
(5) Question not attempted

14. Which of the following is a communicable disease caused by a bacterium?
(1) Measles
(2) Malaria
(3) Ringworm
(4) Cholera
(5) Question not attempted

15. The DOTS strategy in India is primarily associated with the control of which disease?
(1) Tuberculosis
(2) Malaria
(3) HIV/AIDS
(4) Leprosy
(5) Question not attempted

16. The infectious stage of Plasmodium that is injected into a human by the bite of a female Anopheles mosquito is called:
(1) Merozoite
(2) Sporozoite
(3) Trophozoite
(4) Gametocyte
(5) Question not attempted

17. Match List I with List II and select the correct answer using the codes given below:
List I: (Non-communicable Disease)
A. Type 2 Diabetes
B. Hypertension
C. Lung Cancer
D. Coronary Artery Disease
List II: (Associated Factor)
i. High sodium intake
ii. Insulin resistance
iii. Atherosclerosis
iv. Tobacco smoking
(1) A-ii, B-i, C-iv, D-iii
(2) A-i, B-ii, C-iii, D-iv
(3) A-ii, B-iii, C-iv, D-i
(4) A-iv, B-i, C-ii, D-iii
(5) Question not attempted

18. The National Mental Health Programme (NMHP) was launched by the Government of India in which year?
(1) 1982

NODIA

in tissue culture, scientists can regenerate healthy plants.

168. (1) Somatic hybridization
Somatic hybridization is a technique where the cell walls of two different plant species are removed to create protoplasts, which are then fused together to form a hybrid cell. This allows for the combination of traits from species that cannot be crossed through sexual reproduction. A famous example is the Pomato, a hybrid produced by fusing protoplasts from potato and tomato.

169. (3) It induces the fusion of plant protoplasts.
Polyethylene glycol is a chemical agent used in agricultural biotechnology to facilitate the fusion of plant protoplasts during somatic hybridization. Because protoplasts are negatively charged, they naturally repel each other. Adding PEG acts as a molecular bridge that reduces this repulsion and alters the cell membrane properties, allowing the protoplasts from two different species to come into close contact and merge.

170. (1) Gene silencing via complementary double-stranded RNA
RNA interference is a natural biological process where double-stranded RNA molecules inhibit gene expression or translation. When dsRNA enters a cell, it is processed into short fragments that guide a protein complex to a specific messenger RNA molecule. The complex then binds to and cleaves the mRNA, preventing it from being translated into a protein. This results in specific gene silencing.

171. (4) 1 to 100 nanometers
Nanotechnology is defined as the study and manipulation of matter at the nanoscale, which is generally considered to be the size range from 1 to 100 nanometers. At this extremely small scale, materials often exhibit unique physical, chemical, and biological properties that differ significantly from those of the same material in bulk form. One nanometer is one-billionth of a meter.

172. (1) A-iv, B-iii, C-ii, D-i
Nanomaterials come in various structural forms. Graphene is a single, two-dimensional layer of carbon atoms in a hexagonal lattice. Carbon Nanotubes are cylindrical structures with immense strength. Quantum dots are tiny semiconductor crystals with unique optical properties, such as size-dependent light emission. Fullerenes are hollow spherical molecules composed of sixty carbon atoms arranged in a pattern resembling a soccer ball.

173. (4) I, II and III
Nanomaterials possess distinct properties compared to bulk materials due to quantum effects and a drastically increased surface area-to-volume ratio, which often significantly enhances their chemical reactivity. The theoretical foundation for the field was famously laid by physicist Richard Feynman in his 1959 lecture. These three points form the fundamental basis for understanding why nanotechnology is so versatile across diverse disciplines.

174. (2) 10^{-9} meters
A nanometer is a unit of length in the metric system equal to one-billionth of a meter. In scientific notation, this is expressed as 10 to the power of negative nine meters. To provide perspective, a single human hair is approximately 80,000 to 100,000 nanometers wide. This extreme miniaturization is what allows nanotechnology to interact with biological molecules on their own scale.

175. (3) Quantum confinement
The unique ability of quantum dots to emit light of specific colors based on their size is a result of a phenomenon called quantum confinement. When a semiconductor crystal becomes smaller than a certain threshold, its electronic properties change. Smaller dots have a larger energy gap and emit shorter wavelengths, while larger dots have a smaller gap and emit longer wavelengths of light.

176. (1) Bottom-up approach
In nanotechnology, the bottom-up approach refers to the process of building complex nanoscale structures by assembling them atom-by-atom or molecule-by-molecule. This is often achieved through chemical synthesis or self-assembly, where molecules naturally organize themselves into stable structures due to their inherent chemical properties. This contrasts with the top-down approach, which involves carving

Click Here to Buy book on Amazon

(4) I, IV, II, III
(5) Question not attempted

28. Which of the following chemicals is widely used as a food preservative to prevent the growth of molds and yeasts in fruit juices?
(1) Monosodium glutamate
(2) Sodium benzoate
(3) Calcium carbide
(4) Sodium bicarbonate
(5) Question not attempted

29. According to food packaging standards in India, what does the green dot symbol on a food package indicate?
(1) The product is organic
(2) The product contains permitted synthetic colors
(3) The product is vegetarian
(4) The product is free from allergens
(5) Question not attempted

30. Which enzyme present in saliva initiates the digestion of starch in the human mouth?
(1) Pepsin
(2) Lipase
(3) Trypsin
(4) Amylase
(5) Question not attempted

31. Which of the following cells are primary components of innate immunity, acting as phagocytes to engulf pathogens?
(1) Macrophages
(2) B-lymphocytes
(3) T-lymphocytes
(4) Erythrocytes
(5) Question not attempted

32. In India's Universal Immunisation Programme, the Pentavalent vaccine protects children against which five diseases?
(1) Diphtheria, Polio, Tetanus, Hepatitis B, and Measles
(2) Diphtheria, Pertussis, Tetanus, Hepatitis B, and Haemophilus influenzae type b
(3) Cholera, Pertussis, Tetanus, Hepatitis A, and Pneumonia
(4) Diphtheria, Pertussis, Typhoid, Hepatitis B, and Haemophilus influenzae type b
(5) Question not attempted

33. Arrange the following events in the correct sequence of the life cycle of the malaria parasite in the human body:
I. Liver infection
II. Red blood cell infection
III. Sporozoite injection
IV. Gametocyte formation
Which of the following represents the correct sequence?
(1) I → II → III → IV
(2) III → I → II → IV
(3) IV → I → III → II
(4) III → II → I → IV
(5) Question not attempted

34. Which of the following diseases is primarily viral in nature?
(1) Dengue
(2) Typhoid
(3) Syphilis
(4) Tetanus
(5) Question not attempted

35. Under the DOTS programme for Tuberculosis, the medication is consumed by the patient:
(1) Consumed independently at home without supervision
(2) Administered during inpatient care in a sanatorium
(3) Observed directly by a trained health worker
(4) Administered exclusively via intravenous injections
(5) Question not attempted

36. Hypertension is medically defined as a sustained elevation of resting systolic and diastolic blood pressure above which threshold?
(1) 120/80 mmHg
(2) 130/85 mmHg
(3) 140/90 mmHg
(4) 110/70 mmHg
(5) Question not attempted

37. Match List I with List II and select the correct answer:
List I: (Mental Health Disorder)
A. Schizophrenia
B. Bipolar Disorder
C. Phobia
D. Anorexia Nervosa
List II: (Key Characteristic)

NODIA

as quantum dots or carbon nanotubes, scientists can create solar cells that absorb a wider range of the solar spectrum and convert light into electricity more effectively. Additionally, some nanomaterials allow for the production of thin-film, flexible solar panels.

186. (4) Treatment of neurological conditions and brain tumors
The blood-brain barrier is a highly selective filtering mechanism that protects the brain from harmful substances in the blood but also prevents most therapeutic drugs from reaching brain tissue. Some specially engineered nanoparticles are small enough and have the right surface properties to cross this barrier. This is a major breakthrough, as it allows for the targeted delivery of drugs.

187. (2) Device for analyzing small fluid volumes on a microchip
A lab-on-a-chip is a device that integrates one or several laboratory functions onto a single chip only millimeters to a few square centimeters in size. Using microfluidics, these chips can process and analyze extremely small volumes of fluids, such as a drop of blood. This technology allows for rapid, portable, and low-cost medical diagnostics, environmental monitoring, and chemical analysis.

188. (1) Larger surface area for efficient charge transport
In batteries like lithium-ion, the use of nanomaterials in the electrodes significantly increases their total surface area. This provides more sites for the chemical reactions that store and release energy to occur, and it allows lithium ions to move in and out of the electrodes more quickly. This results in batteries that can charge much faster and store more energy.

189. (3) Inhaled particles entering the blood and causing harm
A major health concern with nanotechnology is the potential toxicity of inhaled nanoparticles. Because of their extremely small size, these particles can bypass the lungs natural clearance mechanisms and penetrate deep into the respiratory system. From there, they can enter the bloodstream and travel to other organs, where they may cause inflammation, oxidative stress, or other types of cellular damage.

190. (1) Targeted delivery systems that release under conditions
In nanotechnology, smart drugs refer to advanced drug delivery systems designed to transport medication directly to the diseased site in the body while leaving healthy cells untouched. These systems often consist of nanoparticles that encapsulate the drug and are engineered to release their cargo only when they encounter a specific biological trigger, such as a change in pH or specific enzymes.

191. (1) Both Statement I and Statement II are correct.
The Genetic Engineering Appraisal Committee is the primary regulatory body in India established under the Ministry of Environment, Forest and Climate Change. Its main responsibility is to assess and approve the safety and environmental impact of genetically modified organisms before they are released for large-scale field trials or commercial cultivation. This ensures that biotechnology products are safe for human consumption.

NODIA

192. (1) Unauthorized exploitation of resources and knowledge
Biopiracy is the unethical or illegal practice of commercially exploiting biological resources and the traditional knowledge of indigenous communities without providing fair compensation or obtaining proper authorization. This often involves companies from developed nations obtaining patents on traditional medicines found in developing countries, effectively stealing the resource and restricting its use by the original communities who first discovered its beneficial properties.

193. (4) Basmati Rice
In the late 1990s, an American company was granted a US patent for Basmati rice lines and grains. This caused a major international controversy because Basmati is a traditional aromatic rice variety grown for centuries in the Indian subcontinent. India challenged the patent, arguing that it was a case of biopiracy and that the company had not created a new variety.

or breaking down larger materials into smaller pieces.

177. (4) Carbon nanotubes are poorer conductors of electricity than wood.
Carbon nanotubes are actually exceptional conductors of electricity, far superior to wood and even better than some metals like copper. They have the ability to carry high electrical currents with very little resistance. Other statements are correct: gold nanoparticles can appear red or purple; breaking down bulk materials increases their relative surface area; and graphene is famously the thinnest known material.

178. (2) Observe and manipulate individual atoms and molecules
Standard optical microscopes cannot see objects at the nanoscale because they are limited by the wavelength of light. The scanning tunneling microscope and atomic force microscope are revolutionary tools that use physical probes to map the surface of materials at the atomic level. These instruments not only allow scientists to visualize individual atoms but also enable them to physically move and manipulate them.

179. (3) They have high tensile strength and excellent electrical conductivity.
Carbon nanotubes are highly valued in materials science and engineering because of their extraordinary physical properties. They are approximately 100 times stronger than steel but only one-sixth the weight, possessing incredible tensile strength. Combined with their excellent thermal and electrical conductivity, they are ideal for creating advanced composites, more efficient electronics, high-capacity batteries, and even potential futuristic aerospace components.

180. (1) Richard Feynman
Physicist Richard Feynman delivered a famous lecture titled Theres Plenty of Room at the Bottom at a meeting of the American Physical Society in 1959. In this talk, he proposed the then-radical idea that individual atoms could be manipulated and that entire encyclopedias could be written on the head of a pin. This visionary lecture is the conceptual starting point.

181. (3) I, II and III
Nanomedicine utilizes nanoparticles for targeted drug delivery to tumors and uses magnetic particles as contrast agents to improve MRI scans. Nanoshells are also used in photothermal therapy to selectively heat and kill cancer cells. However, nanorobots capable of performing independent surgeries are still largely in the theoretical stages and are certainly not yet widely used in hospitals for complex operations.

182. (1) I, II, III and IV
Nanotechnology has widespread applications: nanoparticles in sunscreens provide UV protection; silver nanoparticles serve as potent antimicrobials; nanofilters are used for water purification; and quantum dots enhance modern QLED displays. However, certain nanomaterials, such as carbon nanotubes and metal-organic frameworks, are actually being extensively researched for their high efficiency in safely storing hydrogen for clean energy vehicles and power systems.

183. (2) Moore's law to continue by miniaturizing transistors to the nanoscale
Moores Law is the observation that the number of transistors on a microchip doubles approximately every two years. To maintain this pace, transistors must become smaller and smaller. Nanotechnology allows engineers to design and manufacture transistors at the scale of just a few nanometers. This extreme miniaturization is essential for creating faster, more powerful, and more energy-efficient computers and electronic devices.

184. (1) Antimicrobial and antibacterial properties
Silver has been known for its antibacterial properties for centuries. At the nanoscale, silver nanoparticles have a much larger surface area, which significantly enhances their ability to release silver ions that disrupt bacterial cell membranes and enzymes. This makes them highly effective at killing a wide range of bacteria, fungi, and viruses, leading to their widespread use in many consumer products today.

185. (3) Photovoltaic (solar) cells
Nanotechnology is being used to improve the efficiency and lower the cost of photovoltaic cells. By using nanostructured materials, such

Downloaded from www.pdf.tube

CHAPTER 05

Human Health, Food Nutrition and Public Health Programmes

NODIA

1. Which of the following components of food primarily serves as the main source of immediate energy for the human body?
(1) Proteins
(2) Carbohydrates
(3) Vitamins
(4) Minerals
(5) Question not attempted

2. Which of the following is an exception to the primary function of proteins in the human body?
(1) Primary energy storage
(2) Repairing various body tissues
(3) Synthesizing metabolic hormones
(4) Forming structural cell components
(5) Question not attempted

3. Consider the following statements regarding fats in the human diet:
I. Saturated fats are typically solid at room temperature.
II. Trans fats increase the levels of high-density lipoprotein (HDL) cholesterol.
III. Fats provide more than double the energy per gram compared to carbohydrates.
Which of the above statement(s) is/are correct?
(1) I and II only
(2) II and III only
(3) I and III only
(4) I, II and III
(5) Question not attempted

4. Which of the following vitamins is correctly paired with its chemical name?
(1) Vitamin A - Calciferol
(2) Vitamin D - Retinol
(3) Vitamin B1 - Riboflavin
(4) Vitamin C - Ascorbic Acid
(5) Question not attempted

5. The deficiency of iron in the human body most directly leads to which of the following conditions?
(1) Goitre
(2) Osteoporosis
(3) Anaemia
(4) Scurvy
(5) Question not attempted

6. The concept of Recommended Dietary Allowance (RDA) refers to the:
(1) Minimum nutrient intake required to sustain human life
(2) Daily intake level sufficient for most healthy people
(3) Maximum safe intake level to avoid potential toxicity
(4) Exact amount of food needed for rapid weight loss
(5) Question not attempted

7. Which of the following is a direct consequence of overnutrition?
(1) Marasmus
(2) Kwashiorkor
(3) Night blindness
(4) Obesity
(5) Question not attempted

8. The presence of Argemone oil in edible mustard oil is a common form of food adulteration that causes which disease?
(1) Epidemic Dropsy
(2) Lathyrism
(3) Fluorosis
(4) Minamata disease
(5) Question not attempted

9. Read the following statements and select the correct option:
Assertion (A): Pasteurization increases the shelf

194. (2) Turmeric (Haldi)
Turmeric has been used in India for thousands of years for its medicinal properties, especially for healing wounds. In 1995, two researchers at a US university were granted a patent for the use of turmeric in wound healing. Indias Council of Scientific and Industrial Research successfully challenged this patent by providing ancient texts as proof of prior art, establishing prior knowledge.

195. (3) Selection of non-medical embryo traits like appearance
The concept of designer babies refers to the use of genetic engineering technologies to select or modify specific traits in a human embryo. The primary ethical concern is that this technology could be used to choose enhancement traits that are not related to health, such as physical appearance or intelligence. This raises fears of social inequality and questions about human commodification.

196. (4) Bioterrorism
Bioterrorism is the intentional release of biological agents, such as viruses or bacteria, to cause widespread illness, death, or panic among people, animals, or plants. These agents can be naturally occurring or genetically modified to be more harmful. Because biological weapons can be difficult to detect and spread rapidly, they represent a significant global security threat and are strictly prohibited.

197. (1) Risks of genetic discrimination by insurance providers
The creation of large-scale national DNA databases raises significant ethical concerns regarding privacy and the potential for genetic discrimination. If an individuals genetic information were accessed by insurance companies or employers, it could lead to higher premiums or loss of employment opportunities. This issue requires strong legal protections to prevent the misuse of personal genetic data in various social contexts.

198. (3) Breeding programs aimed at increasing desirable traits
Eugenics is a historically controversial and now discredited practice that aimed to improve the human race by encouraging reproduction between people with traits considered desirable and discouraging it among those with traits considered undesirable. It was often based on pseudoscientific ideas. Today, the term is frequently brought up in ethical debates surrounding modern genetic engineering technologies and human genetic diversity.

199. (4) Nagoya Protocol
The Nagoya Protocol is an international agreement to the Convention on Biological Diversity. It was established to provide a transparent legal framework for the fair and equitable sharing of benefits arising from the utilization of genetic resources. By requiring researchers to obtain prior informed consent and to share profits with the providing country, the protocol aims to prevent biopiracy effectively.

200. (2) Corporate control over seeds and restriction of saving
A major ethical and social objection to GM crops is that they are often patented by large multinational corporations. This gives these companies significant control over the food supply. Farmers are typically required to sign contracts that prevent them from saving and replanting seeds from one season to the next, forcing them to buy expensive new seeds every year.

www.nodia.in

Click Here to Buy book on Amazon

(2) 1995
(3) 2001
(4) 2014
(5) Question not attempted

19. Under the National Health Mission (NHM), what is the primary role of an ASHA worker?
(1) Performing complex surgical procedures in hospitals
(2) Manufacturing essential vaccines for local programs
(3) Linking the community with the public health system
(4) Conducting inspections to ensure local food safety
(5) Question not attempted

20. Poshan Abhiyan primarily targets the reduction of which of the following conditions in children?
(1) Pediatric obesity and juvenile Type 1 Diabetes
(2) Severe night blindness and symptomatic scurvy
(3) Hereditary and chromosomal genetic disorders
(4) Stunting, under-nutrition, and anaemia
(5) Question not attempted

21. Ayushman Bharat Pradhan Mantri Jan Arogya Yojana (PM-JAY) provides a health cover of up to what amount per family per year?
(1) Rs. 1 Lakh
(2) Rs. 3 Lakhs
(3) Rs. 5 Lakhs
(4) Rs. 10 Lakhs
(5) Question not attempted

22. Which among the following macronutrients is composed of amino acids?
(1) Carbohydrates
(2) Proteins
(3) Lipids
(4) Nucleic acids
(5) Question not attempted

23. Consider the following statements regarding micronutrients:
I. Vitamin B12 is found mainly in animal products.
II. Folic acid deficiency during pregnancy can lead to neural tube defects.
III. Vitamin D facilitates the absorption of calcium in the gut.
IV. Vitamin K is essential for blood coagulation.
V. Vitamin C acts as an antioxidant and is fat-soluble.
Which of the above statement(s) is/are correct?
(1) I, II, III and IV only
(2) I, III, IV and V only
(3) II, III, IV and V only
(4) I, II, IV and V only
(5) Question not attempted

24. A deficiency of dietary iodine most commonly affects the functioning of which gland?
(1) Thyroid gland
(2) Pituitary gland
(3) Adrenal gland
(4) Pancreas
(5) Question not attempted

NODIA

25. An individual with a sedentary lifestyle requires comparatively fewer calories. Which factor does NOT typically influence an individual's Recommended Dietary Allowance (RDA) for energy?
(1) Age
(2) Gender
(3) Blood type
(4) Physiological status (like pregnancy)
(5) Question not attempted

26. In the context of malnutrition, which of the following is considered a form of overnutrition?
(1) Hypervitaminosis A
(2) Cachexia
(3) Sarcopenia
(4) Pellagra
(5) Question not attempted

27. Arrange the following organs in the correct sequence of the passage of food through the human digestive tract:
I. Stomach
II. Oesophagus
III. Large intestine
IV. Small intestine
Which of the following represents the correct sequence?
(1) II, I, IV, III
(2) I, II, IV, III
(3) II, I, III, IV

are harvested and safely disposed of, effectively removing the toxins from the site and restoring the local ecosystem health.

159. (3) They can degrade recalcitrant compounds like plastics instantly.
While superbugs are engineered to degrade complex and difficult pollutants, they cannot do so instantly. Biological processes, even those enhanced by genetic engineering, take time to break down chemical bonds and metabolize compounds. Other statements are true: they are multigene engineered microbes; the first patent for a living GMO was for a superbug; and their environmental release is strictly monitored.

160. (4) Flocs
During the secondary treatment of municipal wastewater, aerobic microbes are actively grown in large aeration tanks. These bacteria, along with fungal filaments, aggregate to form masses called flocs. These flocs are highly efficient at consuming the organic matter present in the sewage. Once the organic load is significantly reduced, the flocs are allowed to settle as activated sludge in the tank.

161. (1) Both A and R are true and R is the correct explanation of A.
RNA interference is a powerful biotechnology tool used to create tobacco plants resistant to the Meloidogyne incognita nematode. By engineering the plant to produce specific double-stranded RNA, the gene silencing mechanism is activated. When the nematode feeds on the plant, it ingests this RNA, which then silences essential genes within the nematodes own cells, eventually leading to the parasites death.

162. (1) C, B, D, A
The process of micropropagation follows a logical sequence. It begins with the selection and surface sterilization of the explant. Next, the explant is inoculated onto a sterile nutrient culture medium. This is followed by the formation of an unorganized mass called a callus and the subsequent regeneration of shoots and roots. Finally, the regenerated plantlets undergo hardening and acclimatization before soil transfer.

163. (2) Totipotency
Totipotency is the unique biological property of a single plant cell that allows it to divide and differentiate into all the various specialized cells of a plant, eventually regenerating into a complete, functional adult organism. This capacity is the fundamental principle behind plant tissue culture and micropropagation, enabling scientists to produce thousands of identical, healthy plants from a small piece of tissue.

164. (1) Callus
In plant tissue culture, when an explant is placed on a nutrient medium containing specific growth regulators, its cells begin to divide rapidly but do not immediately differentiate into specific tissues. This results in the formation of an unorganized, undifferentiated mass of cells known as a callus. By later adjusting the hormone balance in the medium, researchers can induce the callus development.

165. (3) Meloidogyne incognita
Meloidogyne incognita is a species of root-knot nematode that is a major agricultural pest, specifically known for infecting the roots of tobacco plants. This infection causes the formation of galls on the roots, which severely impairs the plants ability to absorb water and nutrients, leading to a significant reduction in crop yield. RNA interference technology was successfully developed to protect plants.

166. (2) Somaclonal variations
Somaclonal variation refers to the genetic and phenotypic variations that occur in plants produced through tissue culture. Although micropropagation is intended to create exact clones, the stress of the laboratory environment and the process of callus formation can sometimes lead to spontaneous mutations or epigenetic changes. While often undesirable for uniform production, these variations can occasionally provide beneficial traits for improvement.

167. (4) Meristem (apical or axillary)
Even if a whole plant is infected with a virus, the meristematic tissues are usually free from the pathogen. This is because the virus cannot keep up with the very high rate of cell division in the meristem and because of the lack of vascular connections. By using the meristem as an explant

Downloaded from www.pdf.tube

i. Extreme mood swings including mania and depression
ii. Irrational fear of a specific object or situation
iii. Hallucinations and delusions
iv. Obsessive fear of gaining weight
(1) A-iii, B-i, C-ii, D-iv
(2) A-i, B-iii, C-iv, D-ii
(3) A-iii, B-ii, C-i, D-iv
(4) A-iv, B-i, C-ii, D-iii
(5) Question not attempted

38. Which of the following is NOT a core component of the National Health Mission (NHM)?
(1) Reproductive, Maternal, Newborn, Child and Adolescent Health (RMNCH$^+$A)
(2) Subsidizing private tertiary care hospitals for cosmetic surgeries
(3) Health System Strengthening
(4) National Disease Control Programmes
(5) Question not attempted

39. Poshan Tracker is an ICT application developed primarily to:
(1) Monitoring the precise locations of all ASHA workers
(2) Evaluating the total agricultural yield of rural farmers
(3) Recording the daily steps walked by school students
(4) Tracking Anganwadi services and nutritional outcomes
(5) Question not attempted

40. Under Ayushman Bharat, the Health and Wellness Centres (HWCs) are established by transforming existing:
(1) Sub-Health and Primary Health Centres
(2) Government-run district hospitals
(3) Specialized regional medical colleges
(4) Privately operated nursing homes
(5) Question not attempted

41. The principal function of dietary fat is to:
(1) Catalyze biochemical reactions
(2) Act as the primary building block of muscle tissue
(3) Serve as a concentrated source of energy
(4) Prevent scurvy
(5) Question not attempted

42. Dietary fiber, a type of carbohydrate, is essential for human health primarily because it:
(1) Promoting bowel regularity and preventing constipation
(2) Is fully digested to yield high amounts of energy
(3) Directly synthesizes Vitamin B in the stomach
(4) Directly increasing total absorption of harmful toxins
(5) Question not attempted

43. Consider the following statements about Vitamin D:
I. It can be synthesized in the human skin upon exposure to sunlight.
II. Its deficiency in children causes Rickets.
III. It is a water-soluble vitamin.
Which of the above statement(s) is/are correct?
(1) I and II only
(2) II and III only
(3) I and III only
(4) I, II and III
(5) Question not attempted

44. Calcium deficiency in older adults can lead to a condition characterized by fragile and porous bones known as:
(1) Osteomalacia
(2) Osteoporosis
(3) Spondylitis
(4) Arthritis
(5) Question not attempted

45. A balanced diet must contain carbohydrates, proteins, and fats ideally in a specific ratio. The general recommended energy contribution ratio from carbohydrates, proteins, and fats respectively is closest to:
(1) 30% : 50% : 20%
(2) 55-60% : 10-15% : 20-30%
(3) 20% : 20% : 60%
(4) 10% : 80% : 10%
(5) Question not attempted

NODIA

46. Kwashiorkor is distinct from Marasmus primarily because Kwashiorkor is caused mainly by a deficiency of:
(1) Chronic lack of total daily calorie consumption
(2) Severe deficiency of dietary Vitamin C

121. One of the primary targets of the Poshan Abhiyan is to reduce stunting in children (0-6 years) by what percentage annually?
(1) 1%
(2) 2%
(3) 5%
(4) 10%
(5) Question not attempted

122. At the national level, which authority is the nodal agency for the implementation of the Ayushman Bharat PM-JAY scheme?
(1) National Health Authority (NHA)
(2) Indian Council of Medical Research (ICMR)
(3) Medical Council of India (MCI)
(4) FSSAI
(5) Question not attempted

123. Consider the following carbohydrates:
I. Glucose
II. Fructose
III. Sucrose
Which of the above is/are considered monosaccharides?
(1) I only
(2) I and II only
(3) II and III only
(4) I, II and III
(5) Question not attempted

124. The deficiency of which vitamin is historically known to affect sailors on long voyages, causing swollen and bleeding gums?
(1) Vitamin A
(2) Vitamin C
(3) Vitamin B12
(4) Vitamin D
(5) Question not attempted

125. Which of the following is an excellent plant-based source of dietary iron?
(1) Apple
(2) Milk
(3) Spinach
(4) Rice
(5) Question not attempted

126. A balanced diet should provide adequate micronutrients. Which of the following statements about micronutrients is correct?
(1) Providing high amounts of metabolic energy
(2) Required in large quantities by the organism
(3) Composed solely of chains of amino acids
(4) Essential for regulating metabolic processes
(5) Question not attempted

127. Severe Acute Malnutrition (SAM) in children is determined by assessing the:
(1) Mid-Upper Arm Circumference
(2) Standardized head circumference
(3) Subcutaneous skinfold thickness
(4) Internal skeletal bone density
(5) Question not attempted

128. Chalk powder is a common adulterant added to sugar or salt. Its presence can be chemically detected by dissolving the sample in water and adding a few drops of:
(1) Ethanol
(2) Hydrochloric acid (HCl)
(3) Sodium hydroxide (NaOH)
(4) Iodine
(5) Question not attempted

129. Read the following statements and select the correct option:
Assertion (A): Vaccination is a method of acquiring passive immunity.
Reason (R): Vaccines contain pre-formed antibodies that immediately neutralize pathogens.
(1) Both A and R are true and R is the correct explanation of A.
(2) Both A and R are true but R is not the correct explanation of A.
(3) A is true but R is false.
(4) Both A and R are false.
(5) Question not attempted

130. According to food packaging and labeling regulations in India, the nutritional information per 100g/100ml must mandatorily include all EXCEPT:
(1) Geographic coordinates of the farm
(2) Total energy value (measured in kcal)
(3) Total protein content (grams per unit)
(4) Total carbohydrates and dietary sugar
(5) Question not attempted

131. The gastric juice in the human stomach contains a proteolytic enzyme called pepsin, which functions optimally in:

Click Here to Buy book on Amazon

STUDYING FROM PDFs?

THINK AGAIN.

If you are studying only from PDFs,
you are wasting valuable time.

Research shows that learning from

PRINTED BOOKS has up to

4× HIGHER RETENTION

than studying from screens.

PRINT BOOK = BETTER MEMORY

PDF = LOWER RETENTION

Those who study from **PRINTED BOOKS**
move **AHEAD.**

Others are left **BEHIND**
in competition.

In competitive exams,
being average is not enough.

STAY ONE STEP AHEAD.

56. Type 1 Diabetes is fundamentally characterized by:
(1) Autoimmune destruction of pancreatic beta cells
(2) Inability to utilize insulin via systemic resistance
(3) Chronic overconsumption of sugar causing exhaustion
(4) Endocrine overproduction of insulin and hypoglycemia
(5) Question not attempted

57. Match List I with List II and select the correct answer:
List I: (Public Health Programme/Initiative)
A. Mission Indradhanush
B. Poshan Abhiyan
C. NMHP
D. Ayushman Bharat
List II: (Target/Objective)
i. Mental health care access
ii. Universal health coverage and financial protection
iii. Full immunization of children and pregnant women
iv. Eradication of malnutrition
(1) A-iii, B-iv, C-i, D-ii
(2) A-ii, B-i, C-iv, D-iii
(3) A-iii, B-i, C-iv, D-ii
(4) A-iv, B-iii, C-ii, D-i
(5) Question not attempted

58. Stigma associated with mental health disorders often leads to:
(1) Delayed treatment seeking and social isolation
(2) Significant increase in seeking clinical psychiatric help
(3) Better integration and acceptance into the local society
(4) Complete remission of symptoms without clinical support
(5) Question not attempted

59. The Janani Suraksha Yojana (JSY) under the National Health Mission aims primarily to:
(1) Providing free secondary education to all girl children
(2) Eradicating the social practice of female infanticide
(3) Providing sustainable employment to rural sector women
(4) Promoting institutional delivery to reduce mortality
(5) Question not attempted

60. The month of September is celebrated annually in India under the Poshan Abhiyan as:
(1) Rashtriya Swasthya Maah
(2) Rashtriya Poshan Maah
(3) Rashtriya Bal Maah
(4) Rashtriya Nari Maah
(5) Question not attempted

61. Eligibility for beneficiaries under the Ayushman Bharat PM-JAY is based primarily on:
(1) Possession of an official Aadhar card
(2) Willingness to pay a nominal monthly premium
(3) SECC 2011 database criteria
(4) Direct employment within the government sector
(5) Question not attempted

62. Essential amino acids are defined as those that:
(1) Nutrients that the human body can synthesize internally
(2) Amino acids exclusively found within plant-based foods
(3) Compounds that aid muscle building but aren't essential
(4) Amino acids that must be obtained through the diet
(5) Question not attempted

63. Consider the following statements regarding micronutrient deficiency:
I. Night blindness is an early sign of Vitamin A deficiency.
II. Pellagra is caused by a deficiency of Niacin (Vitamin B3).
III. Scurvy is characterized by bleeding gums and delayed wound healing.
IV. Iron deficiency anemia causes fatigue and reduced cognitive function.
V. Iodine deficiency during pregnancy can lead to cretinism in the child.
Which of the above statement(s) is/are correct?
(1) I, II and III only
(2) II, III, IV and V only
(3) I, III, IV and V only
(4) I, II, III, IV and V

Downloaded from www.pdf.tube

intake
(3) Critical lack of essential fatty acids in diet
(4) Protein deficiency despite adequate calorie intake
(5) Question not attempted

47. The detection of starch adulteration in milk is commonly done by adding which of the following reagents?
(1) Iodine solution
(2) Benedict's solution
(3) Litmus paper
(4) Silver nitrate
(5) Question not attempted

48. Food preservation by the method of canning involves:
(1) Freezing food items at extremely low temperatures
(2) Heat-killing microbes and sealing in airtight cans
(3) Using sunlight to remove moisture through drying
(4) Adding excessively high levels of sodium chloride
(5) Question not attempted

49. Read the following statements and select the correct option:
Assertion (A): FSSAI has banned the use of calcium carbide for ripening fruits.
Reason (R): Calcium carbide contains traces of arsenic and phosphorus which are hazardous to human health.
(1) Both A and R are true and R is the correct explanation of A.
(2) Both A and R are true but R is not the correct explanation of A.
(3) A is true but R is false.
(4) A is false but R is true.
(5) Question not attempted

50. The finger-like projections found in the inner lining of the small intestine that increase the surface area for absorption are called:
(1) Villi
(2) Cilia
(3) Flagella
(4) Rugae
(5) Question not attempted

51. Adaptive immunity is characterized by:
(1) Immediate response and lack of memory
(2) Non-specific response to foreign bodies
(3) Specificity and immunological memory
(4) Presence of physical barriers like skin
(5) Question not attempted

52. The primary mechanism of a vaccine is to introduce into the body:
(1) Administering pre-formed antibodies for infections
(2) Using chemical antibiotics to eliminate bacteria
(3) Providing high vitamin doses to boost general health
(4) Stimulating immune systems with specific antigens
(5) Question not attempted

53. Consider the following statements regarding communicable diseases:
I. Dengue is transmitted by the Aedes mosquito.
II. Typhoid is a waterborne viral infection.
III. Cholera causes severe diarrhea and dehydration.
IV. Rabies affects the central nervous system.
Which of the above statement(s) is/are correct?
(1) I, II and III only
(2) I, III and IV only
(3) II, III and IV only
(4) I, II, III and IV
(5) Question not attempted

54. The initial intensive phase of tuberculosis treatment under DOTS typically lasts for:
(1) 2 weeks
(2) 2 months
(3) 6 months
(4) 1 year
(5) Question not attempted

55. Which species of Plasmodium causes the most severe and fatal form of malaria in humans?
(1) Plasmodium vivax
(2) Plasmodium ovale
(3) Plasmodium malariae
(4) Plasmodium falciparum
(5) Question not attempted

NODIA

I. Inhalation of bacilli
II. Multiplication in alveoli
III. Formation of granulomas
IV. Cavitation of lung tissue
Which of the following represents the correct sequence?
(1) I, II, III, IV
(2) II, I, IV, III
(3) III, I, II, IV
(4) I, IV, III, II
(5) Question not attempted

74. Which of the following sets consists entirely of viral diseases?
(1) Rabies, Measles, Poliomyelitis
(2) Tuberculosis, Cholera, Typhoid
(3) Malaria, Dengue, Chikungunya
(4) Tetanus, Diphtheria, Pertussis
(5) Question not attempted

75. Multi-Drug Resistant Tuberculosis (MDR-TB) is defined as TB that is resistant to at least which two most powerful first-line anti-TB drugs?
(1) Streptomycin and Ethambutol
(2) Pyrazinamide and Kanamycin
(3) Amikacin and Bedaquiline
(4) Isoniazid and Rifampicin
(5) Question not attempted

76. The National Vector Borne Disease Control Programme (NVBDCP) is responsible for the prevention and control of all the following diseases EXCEPT:
(1) Malaria
(2) Tuberculosis
(3) Kala-azar
(4) Japanese Encephalitis
(5) Question not attempted

77. Match List I with List II and select the correct answer:
List I: (Vaccine Type)
A. Live Attenuated
B. Inactivated / Killed
C. Toxoid
D. Recombinant
List II: (Example)
i. Tetanus
ii. Hepatitis B
iii. Oral Polio Vaccine (Sabin)
iv. Injectable Polio Vaccine (Salk)
(1) A-iii, B-iv, C-i, D-ii
(2) A-iv, B-iii, C-ii, D-i
(3) A-iii, B-ii, C-i, D-iv
(4) A-i, B-iv, C-iii, D-ii
(5) Question not attempted

78. A malignant tumor that originates in epithelial tissues, such as the skin or the lining of internal organs, is classified as a:
(1) Sarcoma
(2) Leukemia
(3) Lymphoma
(4) Carcinoma
(5) Question not attempted

79. The District Mental Health Programme (DMHP) was launched to provide community-based psychiatric services. It functions as a core component of which overarching mission?
(1) National Mental Health Programme (NMHP)
(2) National Health Mission (NHM)
(3) Poshan Abhiyan
(4) PM-JAY
(5) Question not attempted

80. The financing ratio between the Central and State governments for the National Health Mission (NHM) in most plain states (excluding North-Eastern and Himalayan states) is:
(1) 50:50
(2) 60:40
(3) 90:10
(4) 100:0
(5) Question not attempted

81. Under Poshan Abhiyan, what does the term 'Poshan Vatika' refer to?
(1) Specialized hospital wards for malnourished kids
(2) Nutri-gardens in schools providing fresh produce
(3) Mobile digital applications for pregnant women
(4) Cash transfer schemes for lactating mothers
(5) Question not attempted

82. PM-JAY (Ayushman Bharat) provides cashless access to health care services for the beneficiary at the point of service for:
(1) Secondary and tertiary care hospitalization

Click Here to Buy book on Amazon

(2) Only outpatient department (OPD) expenses
(3) Primary care consultations only
(4) Buying medicines from pharmacies without hospitalization
(5) Question not attempted

83. Consider the following statements regarding dietary carbohydrates:
I. Monosaccharides are the simplest form of carbohydrates.
II. Glycogen is the storage form of carbohydrates in plants.
III. Cellulose cannot be digested by the human digestive system.
Which of the above statement(s) is/are correct?
(1) I and II only
(2) II and III only
(3) I and III only
(4) I, II and III
(5) Question not attempted

84. Which vitamin is NOT part of the Vitamin B complex?
(1) Riboflavin
(2) Thiamine
(3) Folic Acid
(4) Tocopherol
(5) Question not attempted

85. The condition where the bones of children become soft and bent due to Vitamin D deficiency is known as:
(1) Scurvy
(2) Osteoporosis
(3) Rickets
(4) Pellagra
(5) Question not attempted

86. Which macronutrient has the highest energy density, providing approximately 9 kilocalories per gram?
(1) Protein
(2) Fat
(3) Carbohydrate
(4) Alcohol
(5) Question not attempted

87. In anthropometric measurements for children, 'Stunting' is defined as:
(1) Low weight for height
(2) Low weight for age
(3) High body mass index for age
(4) Low height for age
(5) Question not attempted

NODIA

88. Water is a common adulterant in milk. Its presence changes the specific gravity of milk, which can be easily detected using a:
(1) Lactometer
(2) Barometer
(3) Hygrometer
(4) Sphygmomanometer
(5) Question not attempted

89. Read the following statements and select the correct option:
Assertion (A): Food irradiation is a preservation method that makes the food radioactive and unsafe for human consumption.
Reason (R): Irradiation involves exposing food to ionizing radiation to destroy bacteria and pests.
(1) Both A and R are true and R is the correct explanation of A.
(2) Both A and R are true but R is not the correct explanation of A.
(3) A is true but R is false.
(4) A is false but R is true.
(5) Question not attempted

90. The internationally recognized standards, codes of practice, and guidelines relating to food, food production, and food safety are maintained by the:
(1) Codex Alimentarius Commission
(2) World Trade Organization (WTO)
(3) FSSAI
(4) Food and Drug Administration (FDA)
(5) Question not attempted

91. The enzyme trypsin, which aids in the digestion of proteins, is secreted by the:
(1) Salivary glands
(2) Stomach
(3) Liver
(4) Pancreas
(5) Question not attempted

92. Immunity acquired by an infant through antibodies passed from the mother via the placenta or breast milk is an example of:
(1) Artificially acquired active immunity
(2) Naturally acquired passive immunity

(3) Naturally acquired active immunity
(4) Artificially acquired passive immunity
(5) Question not attempted

93. Consider the following statements regarding the Universal Immunisation Programme (UIP) in India:
I. BCG vaccine is administered to prevent severe forms of childhood tuberculosis.
II. Rotavirus vaccine is given orally to prevent severe diarrhea.
III. The Hepatitis B vaccine is given at birth.
IV. The pneumococcal conjugate vaccine (PCV) prevents polio.
Which of the above statement(s) is/are incorrect?
(1) I and III only
(2) IV only
(3) II and IV only
(4) I, II and III
(5) Question not attempted

94. Ringworm is a common communicable disease caused by:
(1) A parasitic worm
(2) A bacterium
(3) A virus
(4) A fungus
(5) Question not attempted

95. The BCG vaccine, given at birth, stands for:
(1) Bacillus Calmette-Guérin
(2) Bacterial Cholera Germ
(3) Basic Cure for Gonorrhea
(4) Broad Coverage Gene
(5) Question not attempted

96. Which drug, historically extracted from the bark of the Cinchona tree, is used in the treatment of malaria?
(1) Penicillin
(2) Quinine
(3) Paracetamol
(4) Artemisinin
(5) Question not attempted

97. Match List I with List II and select the correct answer:
List I: (Vitamin)
A. Vitamin A
B. Vitamin C
C. Vitamin E
D. Vitamin K
List II: (Rich Dietary Source)
i. Citrus fruits (e.g., Amla)
ii. Green leafy vegetables (e.g., Spinach)
iii. Carrots and Papaya
iv. Vegetable oils and Nuts
(1) A-iii, B-i, C-iv, D-ii
(2) A-i, B-ii, C-iii, D-iv
(3) A-iii, B-iv, C-i, D-ii
(4) A-ii, B-i, C-iv, D-iii
(5) Question not attempted

98. The hormone insulin, which regulates blood sugar levels and is defective or deficient in diabetes, is produced by:
(1) Beta cells of the pancreatic islets of Langerhans
(2) Alpha cells located within the endocrine pancreas
(3) The outer layers of the functional adrenal cortex
(4) The metabolic cells of the human digestive liver
(5) Question not attempted

99. Which mental health disorder is characterized by alternating periods of deep depression and extreme elation or mania?
(1) Major Depressive Disorder
(2) Post-Traumatic Stress Disorder (PTSD)
(3) Bipolar Disorder
(4) Generalized Anxiety Disorder
(5) Question not attempted

100. Ayushman Bharat Health and Wellness Centres (AB-HWCs) aim to provide Comprehensive Primary Health Care (CPHC), which includes:
(1) Specialized maternal and neonatal child health care
(2) Clinical treatment for various communicable diseases
(3) Performance of complex and high-risk neurosurgeries
(4) Expanded services including NCDs and oral health
(5) Question not attempted

101. Which class of fats constitutes the majority of dietary lipids and body fat stores?
(1) Phospholipids
(2) Sterols

Downloaded from www.pdf.tube

(3) Triglycerides
(4) Waxes
(5) Question not attempted

102. Which of the following vitamins is water-soluble and lost easily during the washing of cut vegetables?
(1) Vitamin A
(2) Vitamin C
(3) Vitamin D
(4) Vitamin K
(5) Question not attempted

103. Consider the following statements regarding essential minerals:
I. Zinc is crucial for immune function and wound healing.
II. Phosphorus and calcium work together to build strong bones and teeth.
III. Magnesium plays a role in muscle and nerve function.
IV. Sodium is mainly an intracellular electrolyte.
V. Potassium helps regulate fluid balance and blood pressure.
Which of the above statement(s) is/are correct?
(1) I, II, III and V only
(2) I, II, III, IV and V
(3) II, III, IV and V only
(4) I, III, IV and V only
(5) Question not attempted

104. The absorption of dietary iron is significantly enhanced by the concurrent consumption of which vitamin?
(1) Vitamin C
(2) Vitamin A
(3) Vitamin B12
(4) Vitamin D
(5) Question not attempted

105. Basal Metabolic Rate (BMR) refers to the energy expended by the body:
(1) Expended during periods of high intensity exercise
(2) Used to digest, absorb, and metabolize food items
(3) Maintaining vital functions while body is at rest
(4) Expended during states of acute emotional distress
(5) Question not attempted

106. The term "Hidden Hunger" refers to a deficiency in:
(1) Micronutrients like vitamins and minerals
(2) Adequate total daily caloric intake
(3) Essential proteins and amino acids
(4) Necessary dietary fats and lipids
(5) Question not attempted

107. Arrange the following progression of the National Mental Health Programme (NMHP) and related initiatives in India in chronological order of their launch:
I. District Mental Health Programme (DMHP)
II. National Mental Health Programme (NMHP)
III. Tele-MANAS initiative
IV. Mental Healthcare Act (the revised act decriminalizing suicide attempts)
Which of the following represents the correct sequence?
(1) II, I, IV, III
(2) I, II, III, IV
(3) II, IV, I, III
(4) IV, II, I, III
(5) Question not attempted

NODIA

108. Papaya seeds are most commonly used to adulterate which of the following spices?
(1) Cumin seeds (Jeera)
(2) Black pepper
(3) Mustard seeds
(4) Cardamom
(5) Question not attempted

109. Which food preservation technique eliminates pathogens through high pressure rather than high heat?
(1) Pasteurization via heat treatment
(2) Lyophilization via freeze-drying
(3) Pascalization (high-pressure process)
(4) Fermentation via microbial action
(5) Question not attempted

110. Under food safety regulations in India, which food businesses are exempted from obtaining a food license but must merely register?
(1) Large scale industrial food manufacturing units
(2) Direct importers of international food products
(3) High-end star-rated luxury hotels and

resorts
(4) Petty operators with turnover below 12 lakhs
(5) Question not attempted

111. The rhythmic muscular contractions that propel food through the digestive tract are known as:
(1) Peristalsis
(2) Mastication
(3) Deglutition
(4) Segmentation
(5) Question not attempted

112. Any foreign substance that induces an immune response in the body, particularly the production of antibodies, is called an:
(1) Antibiotic
(2) Antigen
(3) Immunoglobulin
(4) Interferon
(5) Question not attempted

113. The Hepatitis B vaccine is produced using genetic engineering techniques by inserting the viral gene into a yeast cell. Such a vaccine is called a:
(1) Toxoid vaccine
(2) Recombinant vaccine
(3) Live attenuated vaccine
(4) Conjugate vaccine
(5) Question not attempted

114. Which of the following is a parasitic disease?
(1) Amoebiasis
(2) Tetanus
(3) Poliomyelitis
(4) Diphtheria
(5) Question not attempted

115. In the context of the DOTS strategy, what does DOTS stand for?
(1) Direct Optimal Therapy Strategy
(2) Drug Observation and Treatment Schedule
(3) Directly Observed Treatment, Short-course
(4) Disease Observation and Testing System
(5) Question not attempted

116. Malaria is transmitted to humans through the bite of:
(1) Male Culex mosquito
(2) Female Aedes mosquito
(3) Male Anopheles mosquito
(4) Female Anopheles mosquito
(5) Question not attempted

117. Match List I with List II and select the correct answer:
List I: (Disease)
A. Tuberculosis
B. Malaria
C. Covid-19
D. Typhoid
List II: (Pathogen/Cause)
i. Plasmodium species
ii. Salmonella typhi
iii. Mycobacterium
iv. SARS-CoV-2
(1) A-iii, B-i, C-iv, D-ii
(2) A-i, B-ii, C-iii, D-iv
(3) A-iv, B-iii, C-ii, D-i
(4) A-ii, B-iv, C-i, D-iii
(5) Question not attempted

118. The spread of cancer cells from the primary site of origin to other parts of the body is termed:
(1) Angiogenesis
(2) Metastasis
(3) Apoptosis
(4) Mutation
(5) Question not attempted

119. A condition characterized by persistent feelings of sadness, hopelessness, and a loss of interest in previously enjoyed activities is known as:
(1) Generalized Anxiety Disorder
(2) Schizophrenia
(3) Obsessive-Compulsive Disorder
(4) Major Depressive Disorder
(5) Question not attempted

120. The National Health Mission encompasses two sub-missions. They are:
(1) National Rural Health Mission and National Urban Health Mission
(2) National Tribal Health Mission and National Rural Health Mission
(3) National Child Health Mission and National Maternal Health Mission
(4) National Primary Health Mission and National Tertiary Health Mission
(5) Question not attempted

Click Here to Buy book on Amazon

(5) Question not attempted

64. A goitre is a physical manifestation of the enlargement of the thyroid gland, most commonly due to a lack of dietary:
(1) Iron
(2) Iodine
(3) Calcium
(4) Zinc
(5) Question not attempted

65. The Recommended Dietary Allowance (RDA) for iron is highest for which of the following demographic groups?
(1) Adult males
(2) Pregnant women
(3) Post-menopausal women
(4) Preschool children
(5) Question not attempted

66. Body Mass Index (BMI) is a common metric used to classify malnutrition (underweight and overweight). It is calculated as:
(1) Total weight in kg divided by the height in meters
(2) Weight in kg divided by square of height in meters
(3) Total height in centimeters divided by weight in kg
(4) Total weight in pounds divided by height in inches
(5) Question not attempted

67. Arrange the following steps of detecting food adulteration in a suspected sample in the correct logical sequence:
I. Compare results with standard parameters
II. Collect a representative sample
III. Perform chemical analysis in a certified lab
IV. Document the batch and expiry details of the product
Which of the following represents the correct sequence?
(1) II, IV, III, I
(2) IV, II, I, III
(3) II, III, IV, I
(4) III, I, II, IV
(5) Question not attempted

68. Metanil yellow is a prohibited food dye commonly used illegally to adulterate which of the following food items to enhance its colour?
(1) Milk
(2) Black pepper
(3) Honey
(4) Turmeric powder
(5) Question not attempted

69. High concentrations of salt or sugar preserve food primarily by:
(1) Lowering the pH level to reach extreme acidity
(2) Releasing toxic gases that eliminate bacteria
(3) Drawing water out of microbial cells via osmosis
(4) Solidifying the internal structure of the food
(5) Question not attempted

NODIA

70. Bile juice, which aids in the emulsification of fats, is produced by the _____ and stored in the _____.
(1) Pancreas; Gallbladder
(2) Liver; Gallbladder
(3) Gallbladder; Small intestine
(4) Liver; Pancreas
(5) Question not attempted

71. In the adaptive immune system, antibodies are primarily produced by:
(1) T-helper cells
(2) Natural Killer cells
(3) Macrophages
(4) B-lymphocytes
(5) Question not attempted

72. Which of the following best describes the concept of "Herd Immunity"?
(1) Protection occurring when a large group is immune
(2) Immunity gained through the consumption of animal products
(3) Immunity transferred from mother to child via breastfeeding
(4) A specialized vaccine administered only to local livestock
(5) Question not attempted

73. Arrange the following events in the natural progression of untreated Tuberculosis (TB) infection in the correct sequence:

(1) A highly alkaline environment
(2) A neutral environment
(3) A highly acidic environment
(4) The absence of water
(5) Question not attempted

132. The process by which white blood cells engulf and destroy invading bacteria is termed:
(1) Pinocytosis
(2) Exocytosis
(3) Apoptosis
(4) Phagocytosis
(5) Question not attempted

133. Consider the following statements about communicable diseases:
I. Syphilis is a sexually transmitted viral disease.
II. Hepatitis B is transmitted through infected blood and body fluids.
III. Tetanus is caused by a neurotoxin produced by a bacterium.
IV. Influenza is caused by a virus.
Which of the above statement(s) is/are correct?
(1) I, II and III only
(2) II, III and IV only
(3) I, III and IV only
(4) I, II, III and IV
(5) Question not attempted

134. Which of the following symptoms is highly characteristic of Dengue fever?
(1) Persistent chronic cough
(2) Severe joint and muscle pain (breakbone fever)
(3) Gradual paralysis of lower limbs
(4) Jaundice and liver failure as the primary first symptom
(5) Question not attempted

135. Tuberculosis most commonly affects the lungs. When TB bacilli spread to organs other than the lungs, it is termed:
(1) Pulmonary TB
(2) Multi-drug resistant TB
(3) Latent TB
(4) Extrapulmonary TB
(5) Question not attempted

136. The female Anopheles mosquito requires a human blood meal primarily to:
(1) Nourish her developing eggs
(2) Obtain energy for flight
(3) Survive the winter season
(4) Produce malarial parasites naturally
(5) Question not attempted

137. Match List I with List II and select the correct answer:
List I: (Mineral)
A. Iron
B. Calcium
C. Iodine
D. Zinc
List II: (Key Function/Deficiency effect)
i. Synthesis of thyroid hormones
ii. Formation of haemoglobin
iii. Normal immune function and wound healing
iv. Bone and teeth formation
(1) A-ii, B-iv, C-i, D-iii
(2) A-i, B-ii, C-iii, D-iv
(3) A-iv, B-i, C-ii, D-iii
(4) A-ii, B-iii, C-i, D-iv
(5) Question not attempted

138. The primary cause of Type 2 Diabetes is generally attributed to:
(1) Insulin resistance with relative deficiency
(2) Absolute lack of insulin production from birth
(3) Viral infections damaging the pancreatic cells
(4) Chronic overconsumption of dietary iodine intake
(5) Question not attempted

139. Which of the following is an objective of the National Mental Health Programme (NMHP)?
(1) Institutionalizing all mentally ill persons
(2) Banning the use of psychotropic medications
(3) Mandating surgeries for clinical depression
(4) Integrating mental health with primary care
(5) Question not attempted

140. The National Rural Health Mission (NRHM) was launched in the year:
(1) 1995
(2) 2005
(3) 2014
(4) 2018
(5) Question not attempted

NODIA

childhood
(3) Excessive fear disproportionate to the situation
(4) Conditions instantly cured with one dose of medicine
(5) Question not attempted

180. Under the National Health Mission, Rogi Kalyan Samitis (RKS) are set up to:
(1) Regulating operations of private drug companies
(2) Training medical doctors in complex surgical methods
(3) Conducting randomized and double-blind clinical trials
(4) Hospital societies improving patient care quality
(5) Question not attempted

181. At the village level, the primary frontline worker responsible for delivering nutritional services under the Poshan Abhiyan is the:
(1) Medical Officer
(2) Sarpanch
(3) Anganwadi Worker (AWW)
(4) Police Constable
(5) Question not attempted

182. A unique feature of the Ayushman Bharat PM-JAY scheme is its portability. This means that:
(1) Using health cards as debit cards for general shopping
(2) Cashless treatment at any empanelled hospital in India
(3) Transferring health coverage amounts to another person
(4) Allowing doctors to treat all patients over the phone
(5) Question not attempted

183. Consider the following public health programmes in India:
I. National Vector Borne Disease Control Programme
II. National Tuberculosis Elimination Programme
III. National Mental Health Programme
IV. National Leprosy Eradication Programme
V. National Programme for Control of Blindness
Which of the above are sub-components or fall under the umbrella of the National Health Mission (NHM)?
(1) I, II, and IV only
(2) II, III, IV and V only
(3) I, III, and V only
(4) I, II, III, IV and V
(5) Question not attempted

184. The "4 Ds" — Dermatitis, Diarrhea, Dementia, and Death — are classic symptoms of which nutritional deficiency disease?
(1) Pellagra
(2) Scurvy
(3) Beriberi
(4) Rickets
(5) Question not attempted

185. A deficiency in zinc in children is most strongly associated with:
(1) Increased chance of development of a physical goitre
(2) Sudden development of symptomatic night blindness
(3) Increased risk of severe and prolonged diarrhea
(4) Excessive and uncontrolled bleeding from minor cuts
(5) Question not attempted

186. Which of the following supplements is universally recommended by the WHO for pregnant women to prevent maternal anemia and puerperal sepsis?
(1) Iron and Folic Acid (IFA)
(2) Vitamin C and Vitamin K
(3) Calcium and Vitamin E
(4) Zinc and Magnesium
(5) Question not attempted

187. The term "Wasting" in the context of child malnutrition refers to:
(1) Inadequate height for a given age
(2) Excessive weight for a given height
(3) Lack of intellectual development
(4) Inadequate weight for a given height
(5) Question not attempted

188. Which common household spice is frequently adulterated with artificial colors like Sudan red, which is a known carcinogen?
(1) Turmeric

Downloaded from www.pdf.tube

(4) District Magistrate
(5) Question not attempted

151. Which of the following is NOT a function of the human liver?
(1) Detoxification of chemicals
(2) Storage of glycogen
(3) Production of bile
(4) Secretion of insulin
(5) Question not attempted

152. Which immunoglobulin is predominantly transferred from a mother to her fetus across the placenta, conferring natural passive immunity?
(1) IgG
(2) IgA
(3) IgE
(4) IgM
(5) Question not attempted

153. In India's Universal Immunisation Programme, the rotavirus vaccine is administered via which route?
(1) Intramuscular injection
(2) Intravenous injection
(3) Oral drops
(4) Subcutaneous injection
(5) Question not attempted

154. Typhoid fever is primarily transmitted through:
(1) Contaminated food and water
(2) Mosquito bites
(3) Airborne respiratory droplets
(4) Direct skin-to-skin contact
(5) Question not attempted

155. The Mantoux test (Tuberculin skin test) is used as a screening tool for:
(1) Malaria
(2) Diabetes mellitus
(3) HIV/AIDS
(4) Tuberculosis infection
(5) Question not attempted

156. The classical symptom of malaria involving cold, hot, and sweating stages corresponds to the:
(1) Invasion of healthy liver cells by sporozoites
(2) Rupture of red cells releasing merozoites
(3) Parasite multiplication inside the mosquito gut
(4) Migration of the parasite to the central brain
(5) Question not attempted

157. Match List I with List II and select the correct answer:
List I: (Immune System Component)
A. Skin
B. Lysozyme in tears
C. T-cells
D. Memory B-cells
List II: (Role)
i. Long-term specific immunity
ii. Physical barrier
iii. Cell-mediated immunity
iv. Chemical barrier
(1) A-ii, B-iv, C-iii, D-i
(2) A-i, B-ii, C-iii, D-iv
(3) A-iv, B-iii, C-ii, D-i
(4) A-ii, B-i, C-iv, D-iii
(5) Question not attempted

158. Atherosclerosis, a major cause of coronary artery disease, is characterized by:
(1) Significant thinning of the muscular heart walls
(2) Bacterial infection of the delicate heart valves
(3) Excessive dilation of the major systemic vessels
(4) Deposition of fatty plaques in the arterial walls
(5) Question not attempted

NODIA

159. Which of the following best describes 'Depression' as a clinical mental health disorder?
(1) Persistent sadness affecting daily functioning
(2) Temporary sadness following a disappointing event
(3) Personality disorder marked by extreme arrogance
(4) Cognitive disorder causing permanent memory loss
(5) Question not attempted

160. Under the National Health Mission (NHM), which scheme provides free transport, free drugs, and free diagnostics to pregnant women and sick infants?
(1) Rashtriya Bal Swasthya Karyakram (RBSK)
(2) Janani Shishu Suraksha Karyakaram (JSSK)
(3) Pradhan Mantri Surakshit Matritva Abhiyan

198. Normal human blood pressure is generally considered to be 120/80 mmHg. The number "120" represents the:
(1) Diastolic pressure
(2) Systolic pressure
(3) Pulse pressure
(4) Mean arterial pressure
(5) Question not attempted

199. What is the primary objective of the Tele-MANAS initiative launched under the National Mental Health Programme?
(1) To provide physical fitness training online
(2) To supply psychiatric medicines via home delivery
(3) To train rural doctors in complex neurosurgeries via video conferencing
(4) To offer free 24x7 tele-mental health services and counseling
(5) Question not attempted

200. The Ayushman Bharat scheme envisions upgrading Sub-Health Centres to Health and Wellness Centres (HWCs) to deliver a comprehensive package of how many types of primary health care services?
(1) 4
(2) 7
(3) 12
(4) 20
(5) Question not attempted

www.nodia.in

Click Here to Buy book on Amazon

(1) Drugs and Cosmetics Act, 1940
(2) Fruit Products Order, 1955
(3) Meat Food Products Order, 1973
(4) Milk and Milk Products Order, 1992
(5) Question not attempted

171. The primary function of the large intestine in the human digestive system is to:
(1) Digestion of complex proteins using gastric pepsin
(2) Secretion of bile and other digestive fluid juices
(3) Absorption of glucose and basic protein amino acids
(4) Absorbing water and electrolytes from waste matter
(5) Question not attempted

172. Which of the following components of the immune system releases histamine during an allergic reaction?
(1) Erythrocytes
(2) Mast cells
(3) T-killer cells
(4) Platelets
(5) Question not attempted

173. Consider the following statements about non-communicable diseases (NCDs):
I. They are chronic in nature and progress slowly.
II. Lifestyle factors like tobacco use and physical inactivity are major risk factors.
III. They are transmitted through vectors like mosquitoes.
IV. Cardiovascular diseases account for most NCD deaths globally.
Which of the above statement(s) is/are correct?
(1) I, II and IV only
(2) II, III and IV only
(3) I and II only
(4) I, II, III and IV
(5) Question not attempted

174. Which viral disease, characterized by paralysis and muscular atrophy, has been successfully eradicated from India due to massive immunization efforts?
(1) Measles
(2) Smallpox
(3) Hepatitis B
(4) Poliomyelitis
(5) Question not attempted

175. The causative organism for Tuberculosis is:
(1) The bacterium Mycobacterium tuberculosis
(2) A highly infectious pathogenic human virus
(3) A microscopic single-celled protozoan parasite
(4) The invasive fungus known as Candida albicans
(5) Question not attempted

176. Splenomegaly (enlarged spleen) is a common clinical finding in chronic cases of:
(1) Tetanus
(2) Malaria
(3) Cholera
(4) Rabies
(5) Question not attempted

177. Match List I with List II and select the correct answer:
List I: (Food Item)
A. Ghee
B. Tea leaves
C. Chilli powder
D. Black pepper
List II: (Common Adulterant)
i. Brick powder
ii. Dried papaya seeds
iii. Vanaspati / Animal fat
iv. Used and dried tea leaves colored artificially
(1) A-iii, B-iv, C-i, D-ii
(2) A-i, B-ii, C-iii, D-iv
(3) A-iv, B-iii, C-ii, D-i
(4) A-iii, B-i, C-iv, D-ii
(5) Question not attempted

178. Substances that are known to promote the formation of cancer in the body are termed:
(1) Carcinogens
(2) Antigens
(3) Pathogens
(4) Teratogens
(5) Question not attempted

179. Anxiety disorders differ from everyday anxiety in that they:
(1) Conditions consistently accompanied by hallucinations
(2) Disorders occurring only during a person's

NODIA

141. Under Poshan Abhiyan, what is the target population for ensuring a reduction in anemia?
(1) Only women during their period of pregnancy
(2) Only children within the 0 to 6 year age group
(3) Children, adolescents, and fertile women
(4) Senior citizens and the elderly population
(5) Question not attempted

142. A major objective of the Ayushman Bharat PM-JAY scheme is to reduce:
(1) The total number of operational government hospitals
(2) Basic salaries of primary public health care workers
(3) Levels of international medical tourism for surgery
(4) Out-of-pocket costs for catastrophic health events
(5) Question not attempted

143. Consider the following statements regarding the human digestive system:
I. The liver is the largest internal organ in the human body.
II. Bile contains enzymes that directly digest proteins.
III. The pancreas functions as both an endocrine and exocrine gland.
IV. Water absorption occurs primarily in the large intestine.
V. Hydrochloric acid in the stomach activates pepsinogen.
Which of the above statement(s) is/are correct?
(1) I, II, III and IV only
(2) I, III, IV and V only
(3) II, III, IV and V only
(4) I, II, IV and V only
(5) Question not attempted

144. Vitamin K plays a crucial role in:
(1) Preventing neural tube defects
(2) Synthesis of blood-clotting proteins
(3) Vision in dim light
(4) Enhancing calcium absorption
(5) Question not attempted

145. Which mineral, along with calcium, provides strength and structure to the skeletal system?
(1) Sodium
(2) Phosphorus
(3) Potassium
(4) Iron
(5) Question not attempted

146. A pregnant woman in her second or third trimester generally requires an additional daily intake of approximately how many kilocalories above her non-pregnant requirement?
(1) 50 kcal
(2) 350 kcal
(3) 1000 kcal
(4) 2000 kcal
(5) Question not attempted

147. Obesity is fundamentally caused by a chronic imbalance between:
(1) Disparity between water intake and water output
(2) Imbalance in vitamin and mineral consumption
(3) Imbalance between energy intake and expenditure
(4) Disparity between sleep and physical activity
(5) Question not attempted

148. Synthetic milk is often illegally manufactured by mixing water, oil, detergent, and which of the following chemicals to mimic the nitrogen content of natural milk?
(1) Sodium chloride
(2) Citric acid
(3) Ethanol
(4) Urea
(5) Question not attempted

149. Sodium benzoate and potassium metabisulphite are examples of:
(1) Natural food preservatives
(2) Food adulterants
(3) Class II (Chemical) preservatives
(4) Artificial sweeteners
(5) Question not attempted

150. At the state level in India, who acts as the operational head for food safety under the Food Safety and Standards Act, 2006?
(1) Chief Minister
(2) Commissioner of Food Safety
(3) Director General of Police

Downloaded from www.pdf.tube

(2) Chilli powder
(3) Coriander powder
(4) Cumin
(5) Question not attempted

189. Blanching is a process often used before freezing or canning vegetables. Its primary purpose is to:
(1) Adding specific flavors to the target vegetables
(2) Cooking the food item completely before packaging
(3) Inactivating enzymes that cause flavor and color loss
(4) Completely dehydrating the moisture from vegetables
(5) Question not attempted

190. The "Eat Right India" movement, aiming to transform the country's food system to ensure safe, healthy, and sustainable food, is an initiative led by:
(1) Ministry of Agriculture
(2) NITI Aayog
(3) Indian Medical Association
(4) FSSAI
(5) Question not attempted

191. The digestion of which macronutrient begins in the mouth?
(1) Carbohydrates
(2) Proteins
(3) Fats
(4) Vitamins
(5) Question not attempted

192. Which cells are known as the "scavenger cells" of the immune system because they clear away dead cells and debris?
(1) Red blood cells
(2) Macrophages
(3) B-cells
(4) Platelets
(5) Question not attempted

193. The Covid-19 vaccines produced by Pfizer-BioNTech and Moderna are based on which novel vaccine technology?
(1) Inactivated virus
(2) Messenger RNA (mRNA)
(3) Viral vector
(4) Protein subunit
(5) Question not attempted

194. Hepatitis is a communicable disease that primarily causes inflammation of the:
(1) Liver
(2) Lungs
(3) Heart
(4) Kidneys
(5) Question not attempted

195. Extensively Drug-Resistant Tuberculosis (XDR-TB) is defined as MDR-TB plus resistance to any fluoroquinolone and:
(1) Resistance to any first-line oral anti-TB medication
(2) Resistance to the antibiotic treatment of penicillin
(3) Resistance to at least one second-line injectable
(4) Resistance to the anti-malarial drug called chloroquine
(5) Question not attempted

NODIA

196. Identify the correct pair among the following disease vectors:
(1) Dengue - Culex mosquito
(2) Malaria - Aedes mosquito
(3) Sleeping sickness - Housefly
(4) Kala-azar - Sandfly
(5) Question not attempted

197. Match List I with List II and select the correct answer:
List I: (Programme under NHM)
A. RBSK (Rashtriya Bal Swasthya Karyakram)
B. RKSK (Rashtriya Kishor Swasthya Karyakram)
C. NPHCE
D. PMSMA
List II: (Target Group/Purpose)
i. Adolescents
ii. Elderly population
iii. Pregnant women
iv. Children (Screening for 4Ds)
(1) A-iv, B-i, C-ii, D-iii
(2) A-i, B-ii, C-iii, D-iv
(3) A-iv, B-ii, C-i, D-iii
(4) A-ii, B-iii, C-iv, D-i
(5) Question not attempted

10. (1) Ministry of Health and Family Welfare
The Food Safety and Standards Authority of India is the statutory body responsible for protecting and promoting public health through the regulation and supervision of food safety. It operates under the administrative control of the Ministry of Health and Family Welfare. This alignment ensures that food safety standards are integrated with broader national health objectives.

11. (4) Small intestine
The small intestine is the primary site for the chemical digestion and absorption of nutrients in the human digestive system. Its inner lining is covered with millions of tiny, finger-like projections called villi, which vastly increase the surface area available for absorption. These structures allow glucose, amino acids, and fatty acids to enter the bloodstream efficiently.

12. (2) It is present from birth.
Innate immunity represents the first line of defense against pathogens and is present in an individual from birth. It provides a non-specific response to foreign invaders through physical barriers like skin, chemical barriers, and cellular components like phagocytes. Unlike adaptive immunity, it does not rely on prior exposure to a pathogen or the development of memory.

13. (2) II only
Inactivated vaccines use a killed version of the germ that causes a disease. Because the pathogen is dead, these vaccines typically do not provide as strong an immune response as live vaccines. Consequently, multiple doses or booster shots are often required over time to maintain ongoing immunity. Live attenuated vaccines, however, frequently provide long-lasting protection.

14. (4) Cholera
Cholera is an acute diarrheal infection caused by the ingestion of food or water contaminated with the bacterium Vibrio cholerae. It is a highly communicable disease that can lead to severe dehydration if left untreated. While measles is viral and malaria is protozoal, cholera remains a significant bacterial threat often associated with poor sanitation and hygiene.

15. (1) Tuberculosis
The Directly Observed Treatment, Short-course is the internationally recommended strategy for tuberculosis control. It ensures that patients take their medication under the direct supervision of a trained health worker or designated individual. This approach maximizes treatment adherence, prevents the development of drug-resistant strains, and increases the overall cure rate within the community.

16. (2) Sporozoite
The sporozoite is the infectious stage of the Plasmodium parasite that enters the human body through the saliva of an infected female Anopheles mosquito. Once injected into the bloodstream, these sporozoites travel directly to the liver. There, they infect hepatocytes and begin the next phase of their life cycle, eventually leading to red blood cell infection.

17. (1) A-ii, B-i, C-iv, D-iii
Type 2 diabetes is fundamentally linked to insulin resistance, where cells fail to respond effectively to insulin. Hypertension is often exacerbated by high sodium intake, while lung cancer is strongly associated with tobacco smoking. Coronary artery disease is primarily caused by atherosclerosis, the buildup of plaques in arteries that restricts blood flow to the heart.

18. (1) 1982
The National Mental Health Programme was launched by the Government of India in 1982 to address the heavy burden of mental disorders. Its primary goals include ensuring the availability and accessibility of minimum mental healthcare for all, particularly for the most vulnerable and underprivileged sections of the population, by integrating mental health with general health services.

19. (3) Linking the community with the public health system
Accredited Social Health Activists are community health workers who serve as the primary link between the rural population and the public healthcare system. They play a vital role in mobilizing the community for immunization, institutional delivery, and family planning. Their work is essential for improving maternal and

Click Here to Buy book on Amazon

ANSWERS

1. (2) Carbohydrates
Carbohydrates serve as the primary source of metabolic fuel for human cells. They are broken down into glucose, which is readily utilized by the brain and muscles for immediate energy needs. This efficiency in conversion makes them superior to fats or proteins for quick bursts of activity or sustaining basic physiological processes throughout the daily routine.

2. (1) Primary energy storage
Proteins are essential for structural components of cells, repairing tissues, and synthesizing hormones or enzymes. However, their role in energy storage is minimal compared to fats and carbohydrates. The body primarily stores energy in the form of glycogen or adipose tissue rather than protein, utilizing protein for fuel only during states of prolonged starvation.

3. (3) I and III only
Saturated fats typically maintain a solid state at room temperature due to their chemical structure. Regarding energy density, fats provide approximately nine kilocalories per gram, which is more than double the energy supplied by carbohydrates. Trans fats are harmful because they simultaneously raise low-density lipoprotein levels while lowering high-density lipoprotein levels in the human bloodstream.

4. (4) Vitamin C - Ascorbic Acid
Vitamin C is chemically known as ascorbic acid and is vital for collagen synthesis and immune function. Vitamin A is referred to as retinol, while Vitamin D is called calciferol. Vitamin B1 is scientifically named thiamine. Understanding these chemical names is essential for identifying specific nutrient functions and the corresponding deficiency diseases that might affect health.

5. (3) Anaemia
Iron is a critical component of haemoglobin, the protein in red blood cells responsible for transporting oxygen throughout the body. A deficiency in iron leads to reduced haemoglobin levels, resulting in anaemia. This condition causes symptoms such as fatigue and weakness because the body's tissues and organs do not receive sufficient oxygen for metabolism.

6. (2) Daily intake level sufficient for most healthy people
The Recommended Dietary Allowance represents the average daily dietary nutrient intake level that is sufficient to meet the nutrient requirements of nearly all healthy individuals in a particular life stage and gender group. It serves as a goal for daily intake to ensure nutritional adequacy and prevent chronic diseases associated with specific nutrient deficiencies.

7. (4) Obesity
Overnutrition occurs when the intake of nutrients or calories exceeds the body's actual needs, leading to the excessive accumulation of adipose tissue. Obesity is a direct consequence of this chronic energy imbalance and is associated with various health risks. In contrast, conditions like marasmus and kwashiorkor result from undernutrition, specifically calorie or protein deficiencies.

8. (1) Epidemic Dropsy
Epidemic dropsy is a clinical condition caused by the consumption of mustard oil contaminated with Argemone mexicana oil. This adulterant contains the toxin sanguinarine, which damages capillaries and leads to severe edema, cardiac failure, and potential blindness. It is a significant public health concern requiring strict food safety monitoring to prevent accidental or intentional poisoning.

9. (3) A is true but R is false.
Pasteurization is a heat-treatment process that extends the shelf life of milk by destroying pathogenic microorganisms and reducing the total microbial load. While it effectively eliminates most heat-sensitive bacteria, it does not achieve complete sterilization. Specifically, pasteurization is insufficient to destroy bacterial spores, which require higher temperatures or pressurized steam to be completely eradicated.

Downloaded from www.pdf.tube

(PMSMA)
(4) LaQshya
(5) Question not attempted

161. The implementation of Poshan Abhiyan relies heavily on the convergence of various schemes, primarily converging with the:
(1) Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA)
(2) Integrated Child Development Services (ICDS)
(3) Pradhan Mantri Awas Yojana (PMAY)
(4) Swachh Bharat Mission only
(5) Question not attempted

162. Beneficiaries under Ayushman Bharat are encouraged to create an ABHA card. What does ABHA stand for?
(1) Ayushman Bharat Health Account
(2) All Bharat Health Association
(3) Ayushman Bharat Hospital Access
(4) Annual Basic Health Allowance
(5) Question not attempted

163. Consider the following statements about proteins:
I. They are composed of chains of amino acids.
II. Enzymes are a type of protein that catalyze biochemical reactions.
III. They are the primary and preferred source of energy for the brain.
Which of the above statement(s) is/are correct?
(1) I and II only
(2) II and III only
(3) I and III only
(4) I, II and III
(5) Question not attempted

164. Xerophthalmia and night blindness are clinical manifestations resulting from the deficiency of:
(1) Ascorbic acid
(2) Calciferol
(3) Thiamine
(4) Retinol
(5) Question not attempted

165. Excessive intake of which mineral through drinking water causes dental mottling and skeletal deformities?
(1) Calcium
(2) Iron
(3) Fluoride
(4) Iodine
(5) Question not attempted

166. A balanced diet recommends that the intake of saturated fats should not exceed what percentage of total daily calories?
(1) 10%
(2) 30%
(3) 50%
(4) 0% (Should be completely eliminated)
(5) Question not attempted

167. PM POSHAN (formerly Mid-Day Meal Scheme) addresses malnutrition primarily among which demographic group?
(1) Pregnant women
(2) Lactating mothers
(3) Elderly citizens
(4) School-going children
(5) Question not attempted

NODIA

168. Before the enactment of the Food Safety and Standards Act, 2006, food adulteration in India was primarily regulated under the:
(1) Prevention of Food Adulteration Act, 1954
(2) Essential Commodities Act, 1955
(3) Consumer Protection Act, 1986
(4) Bureau of Indian Standards Act, 1986
(5) Question not attempted

169. Read the following statements and select the correct option:
Assertion (A): Sickle cell trait provides a survival advantage against severe malaria.
Reason (R): The abnormal haemoglobin in sickle cell trait makes the red blood cells less hospitable for the malaria parasite to multiply.
(1) Both A and R are true and R is the correct explanation of A.
(2) Both A and R are true but R is not the correct explanation of A.
(3) A is true but R is false.
(4) A is false but R is true.
(5) Question not attempted

170. The FSSAI was established by consolidating various older acts and orders. Which of the following was NOT one of the orders replaced by the Food Safety and Standards Act, 2006?

child health outcomes by facilitating access to government health services.

20. (4) Stunting, under-nutrition, and anaemia
Poshan Abhiyan, also known as the National Nutrition Mission, is a flagship program aimed at improving nutritional outcomes for children, pregnant women, and lactating mothers. Its specific targets include reducing the prevalence of stunting, underweight, and low birth weight in young children. Additionally, it focuses on decreasing the high rates of anaemia across these vulnerable demographic groups.

21. (3) Rs. 5 Lakhs
Ayushman Bharat PM-JAY is a large-scale government-funded health insurance scheme that provides a significant financial safety net for vulnerable families. It offers a health cover of five lakh rupees per family per year for secondary and tertiary care hospitalization. This initiative aims to reduce out-of-pocket expenditures and prevent families from falling into poverty due to medical costs.

22. (2) Proteins
Proteins are large, complex macronutrients composed of long chains of amino acids linked by peptide bonds. There are twenty different amino acids that combine in various sequences to form diverse proteins, each with unique functions in the body. These functions include acting as enzymes, providing structural support to tissues, and facilitating various essential metabolic processes for survival.

23. (1) I, II, III and IV only
Vitamin B12 is primarily found in animal-based foods, and folic acid is crucial during pregnancy to prevent neural tube defects. Vitamin D is essential for intestinal calcium absorption, while Vitamin K is necessary for blood clotting. Vitamin C is an antioxidant, but it is water-soluble, not fat-soluble, which distinguishes it from vitamins like A, D, E, and K.

24. (1) Thyroid gland
The thyroid gland requires iodine to synthesize essential hormones like thyroxine and triiodothyronine, which regulate metabolism. A deficiency of dietary iodine prevents the gland from producing these hormones efficiently, leading to its enlargement, a condition known as goitre. This physical manifestation is a clear sign that the body is struggling to maintain normal endocrine function.

25. (3) Blood type
An individual's nutritional and energy requirements are determined by factors such as age, gender, physical activity level, and physiological status, such as pregnancy or lactation. These factors influence the metabolic rate and the amount of nutrients needed for growth and maintenance. However, blood type has no scientifically established influence on the Recommended Dietary Allowance for energy or specific nutrients.

26. (1) Hypervitaminosis A
Overnutrition refers to the excessive intake of specific nutrients or total calories beyond the body's requirements. Hypervitaminosis A is a condition resulting from the toxic accumulation of Vitamin A in the body, representing a form of micronutrient overnutrition. In contrast, conditions like pellagra result from deficiency, while cachexia and sarcopenia are characterized by the loss of body mass.

27. (1) II, I, IV, III
Food enters the body through the mouth and travels down the oesophagus into the stomach, where mechanical and chemical digestion begin. From the stomach, the partially digested food moves into the small intestine for further digestion and nutrient absorption. Finally, the remaining waste passes into the large intestine, where water is absorbed before excretion from the body.

28. (2) Sodium benzoate
Sodium benzoate is a widely used chemical preservative that inhibits the growth of potentially harmful bacteria, molds, and yeasts in acidic environments. It is particularly effective in fruit juices, carbonated drinks, and pickles. By preventing microbial spoilage, it extends the shelf life of these products and ensures they remain safe for human consumption over a longer duration.

Click Here to Buy book on Amazon

103. (1) I, II, III and V only
Zinc, calcium, phosphorus, and magnesium are all essential minerals for various bodily functions, including immunity, bone health, and nerve signaling. Potassium is also crucial for fluid balance and blood pressure regulation. However, sodium is primarily an extracellular electrolyte, meaning it is found in higher concentrations in the fluid outside the cells, whereas potassium is the main electrolyte found inside cells.

104. (1) Vitamin C
Vitamin C significantly improves the absorption of non-heme iron, which is the type of iron found in plant-based foods like spinach and beans. It works by converting the iron into a more soluble form that the body can easily absorb in the small intestine. Therefore, consuming Vitamin C-rich foods alongside iron-rich meals is an effective strategy for preventing and managing iron deficiency anaemia.

105. (3) Maintaining vital functions while body is at rest
Basal Metabolic Rate is the minimum amount of energy required to keep the body functioning while it is at a complete state of rest. This energy is used for vital processes such as breathing, blood circulation, cell production, and maintaining body temperature. BMR accounts for the largest portion of a person's total daily energy expenditure and is influenced by factors like age, muscle mass, and gender.

106. (1) Micronutrients like vitamins and minerals
Hidden hunger occurs when a person's diet lacks essential micronutrients, even if they are consuming enough calories to feel full. Because the symptoms of these deficiencies are not always immediately visible, they often go unnoticed for long periods. However, chronic micronutrient deficiencies can have severe long-term consequences, including impaired growth, a weakened immune system, and reduced cognitive development in children and adults.

107. (1) II, I, IV, III
The National Mental Health Programme was launched first in 1982, followed by the District Mental Health Programme in 1996 to decentralize services. The Mental Healthcare Act, which significantly reformed legal protections and rights for patients, was enacted in 2017. Most recently, the Tele-MANAS initiative was launched in 2022 to provide comprehensive 24x7 tele-mental health counseling and support services across India.

108. (2) Black pepper
Dried papaya seeds are a common adulterant used in black pepper because they bear a striking physical resemblance to peppercorns. While they may not be acutely toxic, their use is a fraudulent practice that reduces the quality and flavor of the spice. Consumers can often detect this adulteration by placing peppercorns in water; genuine peppercorns sink, while dried papaya seeds tend to float.

109. (3) Pascalization (high-pressure process)
Pascalization, also known as high-pressure processing, is a food preservation method that uses extremely high pressure to kill harmful bacteria and extend the shelf life of products. Unlike pasteurization, which uses heat, pascalization maintains the nutritional value, flavor, and texture of fresh food more effectively. It is commonly used for products like fruit juices, seafood, and deli meats to ensure safety without chemical additives.

110. (4) Petty operators with turnover below 12 lakhs
Under the Food Safety and Standards Act, small-scale food business operators, such as street vendors and small retailers with an annual turnover of less than twelve lakh rupees, are classified as petty operators. These businesses are exempt from the more complex food licensing requirements but must still complete a simplified registration process. This ensures that even small businesses are brought under the regulatory framework for food safety.

111. (1) Peristalsis
Peristalsis is a series of wave-like muscular contractions that move food along the digestive tract. These involuntary movements occur in the oesophagus, stomach, and intestines, pushing the contents forward and facilitating mechanical digestion. This process is essential for ensuring that food is thoroughly mixed with digestive juices and that nutrients are efficiently moved to the sites where they can be absorbed into the bloodstream.

NODIA

components include maternal and child health services, disease control programs, and systemic improvements in infrastructure. Subsidizing elective cosmetic surgeries in private hospitals falls outside its mandate, as the mission prioritizes essential and life-saving healthcare for the general population, especially the underprivileged.

39. (4) Tracking Anganwadi services and nutritional outcomes
The Poshan Tracker is a specialized digital application designed to provide a real-time monitoring system for the delivery of nutritional services. It allows for the tracking of activities at Anganwadi centres and monitors the growth and nutritional status of children and pregnant women. This data-driven approach helps in identifying gaps in service delivery and ensures the effective implementation of Poshan Abhiyan.

40. (1) Sub-Health and Primary Health Centres
Ayushman Bharat aims to achieve universal health coverage by transforming existing Sub-Health Centres and Primary Health Centres into Health and Wellness Centres. These upgraded facilities are designed to provide comprehensive primary healthcare services closer to the community. This transformation focuses on shifted healthcare from being purely curative to including preventive, promotive, and rehabilitative services for the local population.

41. (3) Serve as a concentrated source of energy
Dietary fats are the most energy-dense macronutrient, providing nine kilocalories per gram. Their primary function is to serve as a concentrated energy reserve that the body can utilize during periods of low calorie intake. Additionally, fats are essential for the absorption of fat-soluble vitamins and provide insulation and protection for vital organs within the human body.

42. (1) Promoting bowel regularity and preventing constipation
Dietary fiber consists of indigestible plant parts that pass relatively intact through the digestive system. Its primary role is to add bulk to the stool and soften it, which facilitates regular bowel movements and prevents constipation. High-fiber diets are also associated with a reduced risk of various chronic conditions, including heart disease, type 2 diabetes, and certain digestive disorders.

43. (1) I and II only
Vitamin D is unique because it can be synthesized by the skin through exposure to ultraviolet B radiation from sunlight. It is a fat-soluble vitamin essential for bone health; its deficiency leads to rickets in children and osteomalacia in adults. Because it is fat-soluble, it is stored in the liver and fatty tissues, unlike water-soluble vitamins that are excreted.

44. (2) Osteoporosis
Osteoporosis is a skeletal condition characterized by decreased bone mass and the deterioration of bone tissue, making them fragile and highly susceptible to fractures. While it can affect anyone, it is particularly common in older adults due to long-term calcium deficiency and hormonal changes. Ensuring adequate intake of calcium and Vitamin D throughout life is essential for maintaining strong bone density.

45. (2) 55-60% : 10-15% : 20-30%
A balanced diet requires a specific distribution of energy from the three primary macronutrients. General nutritional guidelines suggest that carbohydrates should provide the majority of daily calories, followed by fats, with proteins contributing the remaining portion. This ratio ensures that the body receives sufficient fuel for energy, essential fatty acids for cellular health, and amino acids for tissue repair and growth.

46. (4) Protein deficiency despite adequate calorie intake
Kwashiorkor is a form of severe protein-energy malnutrition characterized by significant protein deficiency even when total calorie intake might be nearly sufficient. It is often identified by edema, a swollen abdomen, and skin changes. This differs from marasmus, which is caused by a general deficiency of all nutrients, including proteins and calories, resulting in an extremely emaciated and wasted appearance.

47. (1) Iodine solution
Starch is sometimes added to milk as an adulterant to increase its thickness and solids content. Its presence can be easily detected using an iodine solution. When iodine is added to a

Downloaded from www.pdf.tube

29. (3) The product is vegetarian
In India, food packaging regulations require specific symbols to indicate the dietary nature of the contents. A green dot inside a green square signifies that the food product is vegetarian and contains no animal-derived ingredients. Conversely, a brown dot inside a brown square indicates that the product is non-vegetarian, helping consumers make informed choices based on their preferences.

30. (4) Amylase
Salivary amylase, also known as ptyalin, is an enzyme present in human saliva that initiates the chemical digestion of carbohydrates in the mouth. It works by breaking down complex starch molecules into simpler sugars like maltose. This process begins the moment food is chewed and mixed with saliva, facilitating the subsequent stages of digestion in the gastrointestinal tract.

31. (1) Macrophages
Macrophages are large white blood cells that play a central role in innate immunity. They act as phagocytes, meaning they identify, engulf, and digest pathogens like bacteria, as well as cellular debris. These cells provide an immediate, non-specific response to infection and also help activate other parts of the immune system by presenting antigens to specialized lymphocytes.

32. (2) Diphtheria, Pertussis, Tetanus, Hepatitis B, and Haemophilus influenzae type b
The Pentavalent vaccine is a single injection that protects children against five major life-threatening diseases simultaneously. These include diphtheria, pertussis, tetanus, hepatitis B, and pneumonia or meningitis caused by Haemophilus influenzae type b. This combination vaccine reduces the number of injections required, improving compliance and ensuring broader protection during early childhood within the Universal Immunisation Programme.

33. (2) III → I → II → IV
The malarial life cycle begins when an infected mosquito injects sporozoites into a human. These parasites first migrate to the liver to multiply. After the liver stage, they enter the bloodstream to infect red blood cells, which leads to clinical symptoms. Eventually, some parasites develop into gametocytes, which can be taken up by another mosquito during a bite.

34. (1) Dengue
Dengue is an acute viral disease transmitted to humans through the bite of infected Aedes mosquitoes. It is characterized by high fever, severe headache, and joint pain. In contrast, typhoid and tetanus are caused by bacteria, while syphilis is also a bacterial infection. Identifying the nature of the pathogen is crucial for determining the appropriate medical treatment and prevention.

35. (3) Observed directly by a trained health worker
The core component of the DOTS strategy is the direct observation of treatment. A trained health worker or a community volunteer watches the patient swallow their anti-tuberculosis medication. This practice ensures that the patient adheres to the full treatment regimen, which is critical for curing the disease and preventing the emergence of dangerous multi-drug resistant strains of tuberculosis.

36. (3) 140/90 mmHg
Hypertension is a chronic medical condition where the blood pressure in the arteries is persistently elevated. It is clinically defined when the systolic pressure reaches or exceeds 140 mmHg or the diastolic pressure reaches or exceeds 90 mmHg. Maintaining blood pressure below this threshold is vital for reducing the risk of cardiovascular diseases, stroke, and chronic kidney damage.

37. (1) A-iii, B-i, C-ii, D-iv
Schizophrenia is often marked by hallucinations and delusions, while bipolar disorder involves intense mood swings between mania and depression. A phobia is defined as an irrational and persistent fear of a specific object or situation. Anorexia nervosa is an eating disorder characterized by an obsessive fear of gaining weight, leading to severe self-imposed food restriction and malnutrition.

38. (2) Subsidizing private tertiary care hospitals for cosmetic surgeries
The National Health Mission focuses on strengthening the public health system and improving basic health outcomes. Its core

NODIA

regulate blood glucose levels. Individuals with this condition require lifelong insulin therapy to manage their blood sugar and prevent serious long-term complications.

57. (1) A-iii, B-iv, C-i, D-ii
Mission Indradhanush focuses on the full immunization of children and pregnant women. Poshan Abhiyan is the flagship program aimed at eradicating malnutrition in India. The National Mental Health Programme ensures access to mental healthcare, while Ayushman Bharat provides universal health coverage and financial protection against catastrophic health expenditures for the most vulnerable sections of the population.

58. (1) Delayed treatment seeking and social isolation
Social stigma surrounding mental health often creates a significant barrier to care, as individuals may feel ashamed or fear discrimination. This stigma frequently leads to delayed treatment-seeking behavior, which can worsen the prognosis of the disorder. Furthermore, it often results in social isolation, as affected individuals might withdraw from community activities, further impacting their emotional well-being and recovery process.

59. (4) Promoting institutional delivery to reduce mortality
Janani Suraksha Yojana is a safe motherhood intervention under the National Health Mission. Its primary objective is to reduce maternal and neonatal mortality by promoting institutional deliveries among poor pregnant women. The scheme provides a cash incentive to eligible women who choose to give birth in a government or accredited private health facility, ensuring they receive professional medical care.

60. (2) Rashtriya Poshan Maah
Every year, the month of September is observed as Rashtriya Poshan Maah in India to emphasize the importance of nutrition. This initiative involves a series of activities aimed at creating awareness about healthy eating habits, maternal and child nutrition, and the prevention of anaemia. It encourages community participation to ensure that nutritional goals are met through a collective social movement.

61. (3) SECC 2011 database criteria
Eligibility for the Ayushman Bharat PM-JAY scheme is determined using specific socio-economic criteria from the Socio-Economic Caste Census 2011. This database identifies vulnerable households based on deprivation indicators in rural areas and specific occupational categories in urban areas. This targeted approach ensures that the benefits of the health cover reach the most economically disadvantaged and needy families across India.

62. (4) Amino acids that must be obtained through the diet
Essential amino acids are those that the human body cannot synthesize on its own or cannot produce in sufficient quantities to meet its metabolic needs. Therefore, they must be obtained through dietary sources. There are nine essential amino acids for humans, and a diet lacking these can impair protein synthesis, affecting tissue repair, enzyme production, and overall health and development.

63. (4) I, II, III, IV and V
Micronutrient deficiencies lead to various clinical conditions: Vitamin A lack causes night blindness; Vitamin B3 deficiency results in pellagra; and insufficient Vitamin C leads to scurvy. Iron deficiency causes anaemia, impacting cognitive function and energy. Furthermore, iodine deficiency during pregnancy is a leading cause of cretinism in children, highlighting the vital role these nutrients play in maintaining human health.

64. (2) Iodine
Iodine is an essential trace element required for the production of thyroid hormones, which control various metabolic processes. When dietary iodine intake is insufficient, the thyroid gland compensates by enlarging its size to capture as much iodine as possible from the blood. This resulting swelling in the neck is known as a goitre, a common indicator of iodine deficiency.

65. (2) Pregnant women
During pregnancy, the requirement for iron increases significantly to support the expansion of maternal blood volume and the development of the fetus and placenta. Consequently, the Recommended Dietary Allowance for iron

Click Here to Buy book on Amazon

is highest for pregnant women compared to other groups. Adequate iron intake is crucial for preventing maternal anaemia and ensuring the healthy growth and oxygenation of the developing baby.

66. (2) Weight in kg divided by square of height in meters
Body Mass Index is a simple and widely used anthropometric tool to categorize individuals as underweight, normal weight, overweight, or obese. It is calculated by dividing an individual's weight in kilograms by the square of their height in meters. This metric provides a general assessment of body fatness and helps identify potential health risks associated with different weight categories.

67. (1) II, IV, III, I
To detect food adulteration, the first step is to collect a representative sample of the suspected item. Next, the batch and expiry details of the product must be documented for legal and tracking purposes. The sample is then sent for chemical analysis in a certified laboratory. Finally, the laboratory results are compared with established standard parameters to determine if adulteration occurred.

68. (4) Turmeric powder
Metanil yellow is a non-permitted food color that is sometimes illegally added to turmeric powder to enhance its bright yellow appearance. This chemical is a synthetic dye that can be toxic if consumed, potentially causing damage to the nervous system and liver. Consumers are advised to check the purity of turmeric, as food safety regulations strictly prohibit the use of such dyes.

69. (3) Drawing water out of microbial cells via osmosis
High concentrations of salt or sugar act as preservatives by creating a hypertonic environment. This process, known as osmosis, draws water out of the cells of microorganisms like bacteria and fungi, causing them to shrink and become inactive or die. Without sufficient internal water, these microbes cannot grow or reproduce, thereby preventing the spoilage of the preserved food items.

70. (2) Liver; Gallbladder
Bile is a digestive fluid produced by the liver that plays a critical role in the emulsification of dietary fats. Once produced, it is transported to and stored in the gallbladder, where it becomes more concentrated. During digestion, the gallbladder releases bile into the small intestine to help break down large fat globules into smaller droplets, facilitating efficient enzyme action.

71. (4) B-lymphocytes
B-lymphocytes, or B cells, are a type of white blood cell that forms a key part of the adaptive immune system. When they encounter a specific antigen, they differentiate into plasma cells that produce and secrete large quantities of antibodies. These antibodies circulate in the blood and other body fluids, specifically binding to and neutralizing pathogens like bacteria and viruses.

NODIA

72. (1) Protection occurring when a large group is immune
Herd immunity, also known as community immunity, occurs when a large proportion of a population becomes immune to a specific infectious disease, either through vaccination or previous infection. This high level of immunity makes it difficult for the pathogen to spread, thereby providing indirect protection to those who are not immune, such as infants or individuals with weakened immune systems.

73. (1) I, II, III, IV
Tuberculosis begins when a person inhales the bacilli, which then reach and multiply within the small air sacs of the lungs. The body's immune system responds by forming granulomas to wall off the infection. In progressive disease, these granulomas can break down, leading to the cavitation of lung tissue, which allows the bacteria to spread further and be coughed out.

74. (1) Rabies, Measles, Poliomyelitis
Rabies, measles, and poliomyelitis are all caused by different types of viruses. Rabies is a fatal viral infection of the nervous system, measles is a highly contagious respiratory virus, and polio is a viral disease that can lead to paralysis. In contrast, diseases like tuberculosis and cholera are bacterial, while malaria is caused by a protozoan parasite, not a virus.

75. (4) Isoniazid and Rifampicin
Multi-drug resistant tuberculosis is a specific form of the disease where the bacteria have developed resistance to at least isoniazid and rifampicin. These two drugs are the most powerful first-line medications used in standard tuberculosis treatment. Resistance to them makes the disease significantly harder and more expensive to treat, requiring the use of second-line drugs that may have more side effects.

76. (2) Tuberculosis
The National Vector Borne Disease Control Programme is the central agency for the prevention and control of diseases transmitted by vectors like mosquitoes, sandflies, and ticks. This includes malaria, kala-azar, and Japanese encephalitis. Tuberculosis, however, is a bacterial disease primarily transmitted through respiratory droplets from person to person and is managed under a separate national elimination program.

77. (1) A-iii, B-i, C-ii, D-iv
The Oral Polio Vaccine (Sabin) is a live attenuated vaccine, while the Injectable Polio Vaccine (Salk) is an inactivated version. Tetanus protection is provided by a toxoid vaccine, which uses a neutralized toxin. The Hepatitis B vaccine is a recombinant vaccine produced through genetic engineering. Each type represents a different technological approach to stimulating an effective and safe immune response.

78. (4) Carcinoma
Carcinomas are the most common type of cancer and originate in epithelial tissues, which cover external body surfaces and line internal organs and cavities. Common examples include cancers of the skin, lungs, breasts, and colon. This classification distinguishes them from other types like sarcomas, which arise from connective tissues like bone or muscle, and lymphomas, which originate in the immune system.

79. (1) National Mental Health Programme (NMHP)
The District Mental Health Programme was launched as a core strategy under the National Mental Health Programme to decentralize mental healthcare. It aims to provide community-based services by training primary care doctors and health workers to identify and treat common mental disorders. This approach ensures that mental health services are accessible to the population at the district and sub-district levels.

80. (2) 60:40
The National Health Mission is a centrally sponsored scheme where the funding is shared between the central and state governments. For most states in India, the financing ratio is sixty percent from the center and forty percent from the state. However, for North-Eastern states and Himalayan states, the central government provides a higher share, typically ninety percent, to support health infrastructure.

NODIA

81. (2) Nutri-gardens in schools providing fresh produce
Under the Poshan Abhiyan, Poshan Vatikas are established as nutri-gardens in schools and Anganwadi centres. These gardens are used to grow local fruits, vegetables, and medicinal plants to provide fresh and diverse produce for midday meals. This initiative not only improves the nutritional quality of the food provided to children but also serves as an educational tool for promoting healthy eating.

82. (1) Secondary and tertiary care hospitalization
PM-JAY is designed to provide financial protection specifically for expensive hospital-based treatments. It offers cashless access to health services for secondary care, such as surgeries, and tertiary care, which involves specialized medical procedures. This coverage includes pre-hospitalization and post-hospitalization expenses, ensuring that beneficiaries do not have to pay out of their own pockets during a major medical crisis.

83. (3) I and III only
Monosaccharides like glucose are the simplest carbohydrates and serve as the basic building blocks for more complex types. Cellulose is a structural carbohydrate in plants that the human digestive system cannot break down, although it provides essential dietary fiber. Glycogen is the storage form of carbohydrates in animals, not plants; plants store their excess carbohydrates in the form of starch.

84. (4) Tocopherol
The Vitamin B complex consists of several water-soluble vitamins, including thiamine (B1),

sample containing starch, a chemical reaction occurs that produces a distinct blue or black color. This simple qualitative test is a standard method for ensuring the purity of milk.

48. (2) Heat-killing microbes and sealing in airtight cans
Canning is a preservation method that involves placing food in jars or cans and heating them to a temperature that destroys microorganisms and inactivates enzymes. The subsequent sealing of the containers creates a vacuum that prevents new bacteria from entering. This process allows food to be stored safely at room temperature for extended periods while maintaining its nutritional value and flavor.

49. (1) Both A and R are true and R is the correct explanation of A.
The use of calcium carbide for the artificial ripening of fruits is prohibited because it reacts with moisture to produce acetylene gas, which mimics natural ripening but poses health risks. This chemical often contains impurities such as arsenic and phosphorus hydrides, which are highly toxic. Consumption of fruits ripened this way can lead to serious health issues, including neurological disorders.

50. (1) Villi
Villi are specialized microscopic, finger-like projections that line the inner wall of the small intestine. Their primary function is to increase the surface area available for the absorption of digested nutrients into the bloodstream. Each villus is equipped with a network of capillaries and a lymphatic vessel, allowing for the efficient transport of glucose, amino acids, and fats throughout the body.

51. (3) Specificity and immunological memory
Adaptive immunity is a specialized defense mechanism characterized by its ability to recognize and target specific pathogens. After an initial exposure to a foreign invader, the system develops immunological memory through the production of memory B and T cells. This memory allows the body to mount a faster and more robust immune response if it encounters the same pathogen in the future.

52. (4) Stimulating immune systems with specific antigens
Vaccines work by introducing a harmless version of a pathogen, or its antigens, into the body to stimulate the immune system. This exposure triggers the production of antibodies and the development of memory cells without causing the actual disease. If the individual is later exposed to the real pathogen, their immune system recognizes it immediately and can neutralize it effectively.

53. (2) I, III and IV only
Dengue is indeed transmitted by Aedes mosquitoes, and cholera is characterized by severe diarrhea and dehydration. Rabies is a viral infection that fatally attacks the central nervous system. However, typhoid is a bacterial infection, not a viral one, caused by Salmonella typhi. Understanding these pathogen types is essential for the correct diagnosis and public health management of communicable diseases.

54. (2) 2 months
The standard treatment for tuberculosis under the DOTS strategy is divided into two phases. The initial intensive phase typically lasts for two months and involves the use of multiple potent anti-TB drugs to rapidly kill the majority of the bacilli. This phase is followed by a longer continuation phase designed to eliminate any remaining dormant bacteria and ensure a complete cure.

55. (4) Plasmodium falciparum
Plasmodium falciparum is the most dangerous species of the malaria parasite and is responsible for the majority of malaria-related deaths globally. It can cause severe complications, including cerebral malaria, severe anaemia, and organ failure. Unlike other species, it can infect a high percentage of red blood cells rapidly, leading to life-threatening conditions if not diagnosed and treated promptly with effective medication.

56. (1) Autoimmune destruction of pancreatic beta cells
Type 1 diabetes is a chronic condition in which the immune system mistakenly attacks and destroys the insulin-producing beta cells in the pancreas. This results in an absolute deficiency of insulin, meaning the body can no longer

Downloaded from www.pdf.tube

part of the schedule, often given at birth. However, the pneumococcal conjugate vaccine is designed to prevent pneumonia and meningitis caused by specific bacteria, while polio is prevented by separate oral and injectable vaccines.

94. (4) A fungus
Ringworm, also known as tinea, is a common skin infection characterized by a circular, red, and itchy rash. Despite its name, it is not caused by a worm but by various types of fungi known as dermatophytes. These fungi thrive on the dead tissues of the skin, hair, and nails. It is a communicable disease that spreads through direct contact or contaminated objects.

95. (1) Bacillus Calmette-Guérin
The BCG vaccine is named after Albert Calmette and Camille Guérin, who developed it from a weakened strain of Mycobacterium bovis. It is primarily administered to infants shortly after birth to protect them against severe forms of tuberculosis, such as TB meningitis and disseminated TB. It remains a critical tool in public health programs in countries where tuberculosis is a significant burden.

96. (2) Quinine
Quinine is a natural alkaloid that was historically the primary treatment for malaria. It is extracted from the bark of the cinchona tree, native to South America. Quinine works by interfering with the malaria parasite's ability to process haemoglobin within red blood cells. While newer medications are now more common, quinine is still used today in certain cases of severe or drug-resistant malaria.

97. (1) A-iii, B-i, C-iv, D-ii
Carrots and papaya are excellent sources of Vitamin A, which is essential for vision and skin health. Citrus fruits like amla are exceptionally rich in Vitamin C. Vitamin E is found in high concentrations in vegetable oils and nuts, serving as an antioxidant. Green leafy vegetables like spinach are major dietary sources of Vitamin K, which is necessary for blood clotting.

98. (1) Beta cells of the pancreatic islets of Langerhans
Insulin is a hormone that regulates the amount of glucose in the blood by facilitating its entry into cells for energy. It is specifically produced and secreted by the beta cells located within the islets of Langerhans in the pancreas. A lack of insulin production or a decreased response to it leads to diabetes, resulting in high blood sugar levels and metabolic imbalances.

99. (3) Bipolar Disorder
Bipolar disorder is a mental health condition characterized by significant and often extreme shifts in mood, energy, and activity levels. These shifts include periods of mania, marked by high energy and elation, and episodes of depression, involving deep sadness and hopelessness. It is a chronic condition that requires long-term management, often through a combination of medication and specialized psychological therapy and support.

NODIA

100. (4) Expanded services including NCDs and oral health
Ayushman Bharat Health and Wellness Centres are designed to provide a comprehensive range of primary healthcare services that go beyond maternal and child health. This includes the management of non-communicable diseases, such as hypertension and diabetes, as well as oral and mental health services. By providing these diverse services locally, the centers aim to ensure holistic care for the entire community.

101. (3) Triglycerides
Triglycerides are the most common type of fat found in the human diet and the body's primary form of energy storage. They consist of a glycerol molecule linked to three fatty acid chains. When we consume more calories than we need, the body converts the excess into triglycerides and stores them in adipose tissue, where they serve as a long-term energy reserve.

102. (2) Vitamin C
Vitamin C is a water-soluble vitamin, meaning it dissolves easily in water. When vegetables are cut and then washed or soaked, a significant amount of Vitamin C can leach out into the water and be lost. To preserve the nutritional content of food, it is generally recommended to wash vegetables before cutting them and to use cooking methods like steaming that minimize water contact.

riboflavin (B2), and folic acid (B9). These are essential for energy metabolism and cell function. Tocopherol, however, is the chemical name for Vitamin E, which is a fat-soluble vitamin. Vitamin E acts primarily as an antioxidant, protecting cell membranes from oxidative damage caused by free radicals in the body.

85. (3) Rickets
Rickets is a childhood condition characterized by the softening and weakening of bones, often leading to skeletal deformities like bowed legs. It is primarily caused by a prolonged deficiency of Vitamin D, which is essential for the absorption of calcium and phosphorus. Without these minerals, the growing bone tissue cannot mineralize properly, resulting in structural weakness and an increased risk of fractures.

86. (2) Fat
Among the primary macronutrients, fat has the highest energy density, providing approximately nine kilocalories per gram. In contrast, both proteins and carbohydrates provide about four kilocalories per gram. Because of this high energy concentration, the body utilizes fats as an efficient way to store energy over long periods, while also providing essential fatty acids necessary for various biological functions.

87. (4) Low height for age
Stunting is a form of chronic malnutrition defined by a low height-for-age ratio. It is a consequence of long-term nutritional deficiencies and frequent infections, particularly during the first thousand days of a child's life. Stunting can have permanent effects on physical growth and cognitive development, making it a critical indicator for assessing the long-term nutritional health and well-being of a population.

88. (1) Lactometer
A lactometer is a specialized hydrometer used to measure the specific gravity of milk, which helps in determining its purity. Since water has a lower density than milk, adding water will decrease the overall specific gravity of the mixture. By measuring this property, the lactometer can quickly indicate whether milk has been diluted with water, making it a simple tool for quality control.

89. (4) A is false but R is true.
Food irradiation involves exposing food to controlled amounts of ionizing radiation to kill harmful bacteria, parasites, and insects. While this process effectively improves food safety and extends shelf life, it does not make the food radioactive or unsafe for human consumption. This scientifically proven method is used worldwide and does not leave any residual radiation in the food after the treatment is completed.

90. (1) Codex Alimentarius Commission
The Codex Alimentarius Commission is an international intergovernmental body established by the FAO and WHO. It develops harmonized international food standards, guidelines, and codes of practice to protect the health of consumers and ensure fair practices in the food trade. These standards serve as a global reference point for national food safety regulations and provide a basis for international trade agreements.

91. (4) Pancreas
Trypsin is a vital proteolytic enzyme that breaks down proteins into smaller peptides in the small intestine. It is produced by the pancreas in an inactive form called trypsinogen, which is then activated by another enzyme in the duodenum. This pancreatic secretion is essential for the complete digestion of dietary proteins, allowing the resulting amino acids to be absorbed into the body.

92. (2) Naturally acquired passive immunity
Passive immunity occurs when an individual receives antibodies produced by another person or animal rather than producing them themselves. When a mother passes antibodies to her baby through the placenta or breast milk, it is a natural process that provides the infant with immediate protection against specific diseases. This form of immunity is temporary, lasting only until the maternal antibodies are naturally degraded.

93. (2) IV only
Under the Universal Immunisation Programme, the BCG vaccine prevents childhood tuberculosis, and the rotavirus vaccine protects against severe diarrhea. The Hepatitis B vaccine is also a core

Click Here to Buy book on Amazon

112. (2) Antigen
An antigen is any substance, typically a protein or polysaccharide on the surface of a pathogen, that the immune system recognizes as foreign. When an antigen enters the body, it triggers an immune response, leading to the production of specific antibodies designed to neutralize the invader. This recognition and response mechanism is the foundation of how the body identifies and fights off infections.

113. (2) Recombinant vaccine
A recombinant vaccine is produced by inserting the DNA for a specific antigen from a pathogen into a different cell, such as a yeast or mammalian cell. These cells then produce the antigen, which is purified and used as the vaccine. This technology allows for the creation of safe and effective vaccines, like the Hepatitis B vaccine, without using the actual live virus in the manufacturing process.

114. (1) Amoebiasis
Amoebiasis is a parasitic infection of the intestines caused by the protozoan Entamoeba histolytica. It is primarily spread through the ingestion of contaminated food or water. While bacterial and viral infections are also common causes of digestive disease, amoebiasis is specifically classified as a parasitic disease. Symptoms can range from mild diarrhea to severe dysentery, requiring targeted anti-parasitic medications for effective treatment.

115. (3) Directly Observed Treatment, Short-course
Directly Observed Treatment, Short-course is the standardized global strategy for detecting and treating tuberculosis. It focuses on five main components: political commitment, good quality diagnosis, standardized treatment with direct observation, effective drug supply, and a systematic monitoring and evaluation process. This comprehensive approach is designed to ensure high cure rates and prevent the spread of tuberculosis within the general community.

116. (4) Female Anopheles mosquito
Malaria is a life-threatening disease caused by parasites that are transmitted to people through the bites of infected female Anopheles mosquitoes. Only the female mosquito bites because she needs the protein from human blood to develop her eggs. When she bites an infected person, she takes in the parasite, which then undergoes further development before she can pass it to the next person she bites.

117. (1) A-iii, B-i, C-iv, D-ii
Tuberculosis is caused by Mycobacterium bacteria, while malaria is caused by Plasmodium protozoa. Covid-19 is an acute respiratory disease caused by the SARS-CoV-2 virus. Typhoid fever is a systemic bacterial infection caused by Salmonella typhi. Understanding these specific pathogens is critical for implementing the correct medical treatments and public health strategies to control the spread of each infectious disease.

NODIA

118. (2) Metastasis
Metastasis is the process by which cancer cells break away from the primary tumor and travel through the blood or lymphatic system to form new tumors in other parts of the body. This spread is what makes cancer a particularly dangerous and life-threatening disease. Once a cancer has metastasized, it is often more difficult to treat and requires systemic therapies like chemotherapy rather than localized surgery.

119. (4) Major Depressive Disorder
Major Depressive Disorder is a clinical mental health condition characterized by a persistent and deep sense of sadness and a loss of interest in activities once enjoyed. It significantly impacts a person's ability to sleep, eat, and work, often leading to various emotional and physical problems. Unlike temporary sadness, this disorder requires professional intervention, which may include therapy, medication, or a combination of both treatments.

120. (1) National Rural Health Mission and National Urban Health Mission
The National Health Mission was established to provide equitable, affordable, and quality healthcare services to the entire population. It consists of two major sub-missions: the National Rural Health Mission, which focuses on the health needs of the rural population, and the National Urban Health Mission, which addresses the unique healthcare challenges faced by the urban poor and vulnerable populations in cities.

public health achievement followed years of intensive immunization campaigns using the oral polio vaccine to reach every child. Polio is a viral disease that can cause irreversible paralysis, and its successful eradication from India demonstrates the power of coordinated large-scale vaccination efforts and strong political commitment to eliminating infectious diseases from the population.

175. (1) The bacterium Mycobacterium tuberculosis
Tuberculosis is a serious infectious disease caused by the bacterium Mycobacterium tuberculosis. The bacteria primarily attack the lungs but can also affect other parts of the body. It is spread through the air when an infected person coughs or sneezes. While many people have latent TB, meaning they carry the bacteria without being ill, the active disease requires a prolonged course of multiple antibiotics for a complete cure.

176. (2) Malaria
Splenomegaly, or the enlargement of the spleen, is a common clinical feature of chronic or repeated malarial infections. The spleen plays a key role in filtering out damaged red blood cells and fighting infection. In malaria, the spleen becomes overworked as it clears the high volume of red cells destroyed by the parasite. Over time, this increased activity leads to the significant enlargement of the organ, which can be detected during a physical examination.

177. (1) A-iii, B-iv, C-i, D-ii
Pure ghee is sometimes adulterated with cheaper vanaspati or animal fats to increase its volume. Tea leaves may be mixed with previously used and redried leaves that have been artificially colored. Chilli powder is frequently adulterated with brick powder to add weight and maintain its red appearance. Dried papaya seeds are a classic adulterant for black pepper due to their physical similarity, misleading consumers about the product's quality.

178. (1) Carcinogens
Carcinogens are substances or exposures that can lead to the development of cancer by causing damage to the DNA within cells. These can include chemical substances, such as those found in tobacco smoke, physical agents like ultraviolet radiation, or even certain biological pathogens. Identifying and reducing exposure to known carcinogens is a fundamental part of public health strategies aimed at preventing the onset of various types of cancer.

179. (3) Excessive fear disproportionate to the situation
While everyone experiences occasional anxiety, anxiety disorders are characterized by intense, persistent, and excessive worry and fear about everyday situations. This fear is often disproportionate to the actual threat and can be debilitating, interfering with a person's ability to function in daily life. Common types include generalized anxiety disorder and social anxiety disorder. Treatment often involves a combination of specialized psychological therapies, lifestyle changes, and medication.

180. (4) Hospital societies improving patient care quality
Rogi Kalyan Samitis are hospital management societies established under the National Health Mission to improve the functioning of public health facilities. They are composed of local stakeholders, including community representatives and health officials. These societies have the authority to utilize local funds for hospital maintenance, purchasing essential equipment, and improving patient amenities, thereby ensuring that health services are more responsive to the needs of the local community.

181. (3) Anganwadi Worker (AWW)
Anganwadi workers are the primary frontline personnel responsible for delivering nutritional and basic health services at the village level. They manage the Anganwadi centres where they provide supplementary nutrition, conduct growth monitoring, and offer preschool education to children. These workers also provide essential health and nutrition counseling to pregnant women and lactating mothers, making them a cornerstone of the Poshan Abhiyan and Integrated Child Development Services.

182. (2) Cashless treatment at any empanelled hospital in India
Portability is a key feature of the Ayushman Bharat PM-JAY scheme, allowing eligible beneficiaries to access healthcare services across the country. This means that a person from

Downloaded from www.pdf.tube

130. (1) Geographic coordinates of the farm
Food packaging regulations in India mandate that labels provide essential nutritional information to help consumers make informed choices. This includes the total energy value, protein content, and levels of carbohydrates and sugars. However, the specific geographic coordinates of the farm where the ingredients were grown are not a mandatory requirement for nutritional labeling, although the name and address of the manufacturer must be provided.

131. (3) A highly acidic environment
Pepsin is a proteolytic enzyme in the stomach that initiates the digestion of proteins by breaking them down into smaller peptides. For pepsin to function effectively, it requires a highly acidic environment, which is provided by the hydrochloric acid secreted by the gastric glands. This acidity also serves to activate the precursor pepsinogen into its active form, pepsin, while also killing many ingested bacteria.

132. (4) Phagocytosis
Phagocytosis is a critical process in innate immunity where specialized white blood cells, such as macrophages and neutrophils, identify and ingest foreign particles like bacteria or dead cells. After engulfing the pathogen into a vesicle, the cell uses digestive enzymes to break it down and neutralize the threat. this fundamental mechanism protects the body from infection and helps clear away cellular debris during the healing process.

133. (2) II, III and IV only
Hepatitis B is a viral infection transmitted through contact with infected blood or body fluids, and tetanus is caused by a neurotoxin from the bacterium Clostridium tetani. Influenza is another common viral disease. However, syphilis is a sexually transmitted infection caused by a bacterium, not a virus. Recognizing the specific type of pathogen is essential for effective disease prevention, diagnosis, and clinical management.

134. (2) Severe joint and muscle pain (breakbone fever)
Dengue fever is often referred to as "breakbone fever" because of the intense and debilitating joint and muscle pain it causes. This symptom, along with high fever, severe headache, and a characteristic skin rash, is highly typical of the infection. While most cases are self-limiting, some can progress to more severe forms, such as dengue hemorrhagic fever, requiring urgent medical care and monitoring.

135. (4) Extrapulmonary TB
While tuberculosis most commonly affects the lungs, the bacteria can spread through the blood or lymphatic system to other parts of the body. When the disease occurs in organs like the lymph nodes, kidneys, bones, or brain, it is termed extrapulmonary tuberculosis. This form of the disease is more common in individuals with weakened immune systems and may require different diagnostic approaches than pulmonary tuberculosis.

NODIA

136. (1) Nourish her developing eggs
Female Anopheles mosquitoes require a human or animal blood meal to obtain the necessary proteins and nutrients for the development and maturation of their eggs. Male mosquitoes, on the other hand, do not bite and instead feed primarily on plant nectar for energy. This biological requirement for blood by the female is what makes her the vector for transmitting the malaria parasite between human hosts.

137. (1) A-ii, B-iv, C-i, D-iii
Iron is essential for the formation of haemoglobin, which transports oxygen in the blood. Calcium is vital for the structural integrity of bones and teeth. Iodine is required for the synthesis of thyroid hormones that regulate metabolism. Zinc plays a crucial role in normal immune function and wound healing. Each of these minerals is indispensable for maintaining various physiological processes and overall health.

138. (1) Insulin resistance with relative deficiency
Type 2 diabetes is primarily characterized by insulin resistance, a condition where the body's cells do not respond properly to insulin. To compensate, the pancreas initially produces more insulin, but over time, it may not be able to produce enough to maintain normal blood sugar levels. This leads to a relative insulin deficiency and elevated blood glucose, which can cause serious health complications if left unmanaged.

157. (1) A-ii, B-iv, C-iii, D-i
The skin serves as the primary physical barrier of the innate immune system. Lysozymes found in tears act as a chemical barrier by destroying the cell walls of certain bacteria. T-cells are central to cell-mediated immunity, directly attacking infected cells. Memory B-cells provide long-term specific immunity by remembering past infections and producing antibodies quickly upon re-exposure to the same pathogen.

158. (4) Deposition of fatty plaques in the arterial walls
Atherosclerosis is a condition where the arteries become narrowed and hardened due to the buildup of fatty deposits called plaques. These plaques consist of cholesterol, fatty substances, cellular waste products, and calcium. Over time, this buildup restricts the flow of oxygen-rich blood to the heart and other parts of the body, which can lead to serious cardiovascular problems such as heart attacks and strokes.

159. (1) Persistent sadness affecting daily functioning
Clinical depression is a serious mental health disorder that goes beyond temporary feelings of sadness. It is characterized by a persistent and pervasive low mood, loss of interest in activities, and various physical symptoms that significantly interfere with a person's daily life and functioning. Depression is a treatable condition, and seeking help from mental health professionals is essential for managing the disorder and improving quality of life.

160. (2) Janani Shishu Suraksha Karyakaram (JSSK)
Janani Shishu Suraksha Karyakaram is an initiative under the National Health Mission that aims to eliminate out-of-pocket expenses for pregnant women and sick infants. It entitles all pregnant women delivering in public health institutions to absolutely free and cashless delivery, including drugs, diagnostics, and transport. The scheme also provides similar benefits for sick infants up to one year of age, ensuring that financial barriers do not prevent life-saving care.

161. (2) Integrated Child Development Services (ICDS)
Poshan Abhiyan is designed to work in close convergence with the Integrated Child Development Services program. The ICDS provides the infrastructure and workforce, through Anganwadi centres and workers, to deliver supplementary nutrition and basic health services. By aligning these two major initiatives, the government aims to create a more effective and coordinated system for addressing malnutrition and improving health outcomes for children and mothers across India.

162. (1) Ayushman Bharat Health Account
An Ayushman Bharat Health Account is a unique fourteen-digit health identification number that helps individuals digitally store and manage their health records. It allows for the seamless sharing of medical history, prescriptions, and lab reports with healthcare providers across the country. This digital tool is a key part of the Ayushman Bharat Digital Mission, aimed at creating a more efficient and integrated healthcare ecosystem for all citizens.

163. (1) I and II only
Proteins are essential macromolecules composed of amino acids and include enzymes that catalyze biochemical reactions. They are vital for growth and tissue repair. However, carbohydrates, specifically glucose, are the primary and preferred source of energy for the brain. While the body can use proteins for energy in extreme circumstances, their primary roles are structural and functional rather than serving as the main source of fuel.

164. (4) Retinol
Retinol, also known as Vitamin A, is essential for maintaining healthy vision and the integrity of the skin and mucous membranes. A deficiency in Vitamin A can lead to xerophthalmia, a condition characterized by abnormal dryness of the eye, which can eventually lead to permanent blindness if not treated. Night blindness, the inability to see in low light, is often one of the earliest signs of this nutritional deficiency.

165. (3) Fluoride
While a small amount of fluoride is beneficial for preventing tooth decay, excessive intake through drinking water can lead to fluorosis. Dental fluorosis causes the permanent mottling or discoloration of teeth. Skeletal fluorosis is a more severe condition resulting from long-term

Click Here to Buy book on Amazon

148. (4) Urea
Synthetic milk is sometimes illegally produced using various chemicals to mimic the appearance and properties of natural milk. Urea is often added to these mixtures because it increases the nitrogen content, which can mislead standard tests used to estimate protein levels. Consuming such adulterated products is highly dangerous and can lead to serious health problems, including kidney damage and other systemic toxic effects.

149. (3) Class II (Chemical) preservatives
Sodium benzoate and potassium metabisulphite are classified as Class II or chemical preservatives. These substances are added to food in strictly regulated amounts to inhibit the growth of microorganisms and prevent spoilage. While Class I preservatives include natural substances like salt and sugar, Class II preservatives are synthetic chemicals that provide powerful antimicrobial action, particularly in products like jams, squashes, and pickles.

150. (2) Commissioner of Food Safety
Each state in India appoints a Commissioner of Food Safety as the head of the food safety administration at the state level. The Commissioner is responsible for the efficient implementation of the Food Safety and Standards Act, overseeing the enforcement of food safety regulations and ensuring that food businesses comply with established standards to protect the health and well-being of the state's population.

151. (4) Secretion of insulin
The liver is a highly versatile organ involved in detoxification, the storage of energy in the form of glycogen, and the production of bile for fat digestion. However, it does not secrete insulin; that function is performed exclusively by the beta cells of the pancreas. Insulin is a hormone that regulates blood sugar, while the liver responds to insulin by taking up glucose from the blood.

152. (1) IgG
Immunoglobulin G is the most abundant antibody in the bloodstream and is the only class of antibodies that can cross the placenta from a mother to her fetus. This transfer provides the newborn with significant protection against various infections during the first few months of life. This natural passive immunity is vital for the infant's survival while its own immune system is still developing and maturing.

153. (3) Oral drops
The rotavirus vaccine is administered to infants as oral drops to protect them against rotavirus, which is a leading cause of severe diarrhea and dehydration in young children worldwide. Providing the vaccine orally is an effective and non-invasive way to stimulate an immune response in the gut, where the virus typically attacks. This vaccine is a key component of the Universal Immunisation Programme.

154. (1) Contaminated food and water
Typhoid fever is caused by the bacterium Salmonella typhi and is primarily transmitted through the fecal-oral route. This occurs when a person consumes food or water that has been contaminated by the waste of an infected individual or a chronic carrier of the bacteria. Maintaining high standards of personal hygiene, sanitation, and water safety is critical for preventing the spread of this serious bacterial infection.

155. (4) Tuberculosis infection
The Mantoux test is a diagnostic tool used to determine if a person has been infected with Mycobacterium tuberculosis. It involves injecting a small amount of tuberculin purified protein derivative into the skin of the forearm. A healthcare professional then examines the site after forty-eight to seventy-two hours; a characteristic swelling or induration indicates a positive reaction, suggesting that the person's immune system has recognized the bacteria.

156. (2) Rupture of red cells releasing merozoites
The classical fever paroxysms of malaria, which include stages of intense cold, high fever, and profuse sweating, are caused by the periodic rupture of infected red blood cells. When these cells burst, they release thousands of merozoites and various metabolic waste products into the bloodstream. This synchronous release triggers the body's inflammatory response, leading to the characteristic cycles of fever that are typical of the malarial infection.

Downloaded from www.pdf.tube

121. (2) 2%
One of the key goals of Poshan Abhiyan is to reduce the prevalence of stunting in children under six years of age by two percent annually. By targeting this specific reduction, the program aims to significantly lower the overall burden of chronic malnutrition over time. This objective is pursued through a multi-sectoral approach involving improved nutrition, better healthcare services, and increased social awareness.

122. (1) National Health Authority (NHA)
The National Health Authority is the apex government body responsible for implementing India's flagship public health insurance scheme, Ayushman Bharat PM-JAY. Its role includes managing the scheme's overall strategy, coordinating with state governments, and ensuring the smooth operation of the IT systems used for beneficiary identification and claims processing. The NHA is critical for achieving the goal of universal health coverage.

123. (2) I and II only
Monosaccharides are the simplest sugars and cannot be further hydrolyzed into smaller units. Glucose and fructose are both examples of monosaccharides that are naturally found in various foods. Sucrose, on the other hand, is a disaccharide formed by the chemical bonding of one glucose molecule and one fructose molecule. Understanding these classifications is important for grasping how carbohydrates are digested and metabolized.

124. (2) Vitamin C
Scurvy is a disease resulting from a severe deficiency of Vitamin C, which is essential for the production of collagen. Historically, it was common among sailors who lacked access to fresh fruits and vegetables during long sea voyages. Symptoms include fatigue, swollen and bleeding gums, and joint pain. The discovery that citrus fruits could prevent and cure scurvy was a major breakthrough in nutritional science.

125. (3) Spinach
Spinach is well-known for being an excellent plant-based source of iron, specifically non-heme iron. While iron is also found in animal products, leafy green vegetables like spinach provide a vital source for individuals following a vegetarian or vegan diet. To maximize the absorption of iron from spinach, it is often recommended to consume it with foods rich in Vitamin C, such as citrus fruits.

126. (4) Essential for regulating metabolic processes
Micronutrients, which include various vitamins and minerals, are required by the body in very small amounts. Although they do not provide energy themselves, they are essential for regulating a wide range of metabolic processes, including growth, immune function, and brain development. Because the body cannot produce most micronutrients, they must be obtained through a varied and balanced diet for optimal health.

127. (1) Mid-Upper Arm Circumference
The Mid-Upper Arm Circumference is a quick and effective measurement used to screen children for severe acute malnutrition. A measurement below a specific threshold indicates significant wasting and an increased risk of mortality. This tool is particularly useful in community settings because it is easy to perform and requires minimal equipment, allowing for the rapid identification and referral of malnourished children.

128. (2) Hydrochloric acid (HCl)
Chalk powder, often added as an adulterant to sugar or salt, is composed of calcium carbonate. When hydrochloric acid is added to a sample containing chalk, a chemical reaction occurs that releases carbon dioxide gas, which can be observed as effervescence or bubbling. This simple test allows for the detection of insoluble mineral matter that should not be present in pure salt or sugar.

129. (4) Both A and R are false.
Vaccination is a method of acquiring active immunity, not passive immunity. It works by introducing a harmless antigen into the body, which then stimulates the person's own immune system to produce antibodies and memory cells. Passive immunity, conversely, involve the direct transfer of pre-formed antibodies from another source. Therefore, vaccines do not contain pre-formed antibodies but rather trigger the body's natural defense mechanism.

NODIA

high exposure, leading to bone deformities, joint pain, and limited mobility. Monitoring fluoride levels in water sources is essential for preventing these chronic health issues.

166. (1) 10%
Most nutritional guidelines recommend that saturated fats should contribute less than ten percent of a person's total daily calorie intake. High consumption of saturated fats, commonly found in animal products and certain plant oils, is associated with increased levels of LDL cholesterol and a higher risk of heart disease. Replacing some saturated fats with unsaturated fats is generally advised for maintaining better cardiovascular health.

167. (4) School-going children
PM POSHAN is a school feeding program designed to improve the nutritional status of school-age children across India. By providing a hot, cooked meal every school day, the scheme aims to address hunger and malnutrition while also encouraging school attendance and improving concentration in the classroom. This program is one of the largest of its kind in the world and plays a vital role in child development and education.

168. (1) Prevention of Food Adulteration Act, 1954
The Prevention of Food Adulteration Act of 1954 was the primary legislation in India governing food safety for several decades. It set various standards for food purity and provided the legal framework for detecting and punishing food adulteration. In 2006, this act and several other food-related orders were consolidated into the more comprehensive Food Safety and Standards Act to create a single, unified regulatory authority.

169. (1) Both A and R are true and R is the correct explanation of A.
Individuals with the sickle cell trait have a survival advantage in regions where malaria is endemic. The sickle cell mutation causes some red blood cells to take on an abnormal shape, which makes it difficult for the Plasmodium parasite to survive and multiply within them. This natural selection has resulted in a higher prevalence of the sickle cell gene in populations historically exposed to severe forms of malaria.

170. (1) Drugs and Cosmetics Act, 1940
The Food Safety and Standards Act of 2006 was created by consolidating eight different older acts and orders related to food to streamline regulations. This included the Fruit Products Order and the Meat Food Products Order. However, the Drugs and Cosmetics Act of 1940 remains a separate piece of legislation that specifically regulates the manufacturing and sale of drugs and cosmetics, rather than food products.

171. (4) Absorbing water and electrolytes from waste matter
The large intestine is the final section of the human digestive tract. Its primary function is to absorb water, salts, and certain vitamins from the indigestible food matter that remains after the small intestine has absorbed most nutrients. This process converts the liquid waste into solid stool, which is then stored before excretion. Maintaining proper hydration is essential for the efficient functioning of the large intestine.

172. (2) Mast cells
Mast cells are a type of white blood cell that plays a central role in allergic reactions and the body's inflammatory response. When these cells encounter an allergen to which they have been sensitized, they release various chemicals, most notably histamine. Histamine causes common allergy symptoms such as swelling, itching, and redness by increasing the permeability of blood vessels and stimulating nerve endings in the affected tissue.

173. (1) I, II and IV only
Non-communicable diseases are chronic conditions like heart disease and cancer that develop slowly over time. They are not transmitted through pathogens or vectors but are largely influenced by lifestyle factors such as poor diet, tobacco use, and lack of exercise. Cardiovascular diseases are currently the leading cause of death among NCDs worldwide. Understanding these risks is essential for implementing public health strategies focused on prevention and lifestyle modification.

174. (4) Poliomyelitis
India was officially certified polio-free by the World Health Organization in 2014. This major

Click Here to Buy book on Amazon

139. (4) Integrating mental health with primary care
One of the primary objectives of the National Mental Health Programme is to ensure the availability of mental healthcare services at the primary healthcare level. By integrating mental health with general health services, the program aims to make care more accessible and reduce the stigma associated with seeking psychiatric help. This approach focuses on community-based treatment rather than long-term institutionalization of patients.

140. (2) 2005
The National Rural Health Mission was launched in 2005 to provide accessible, affordable, and quality healthcare to the rural population, especially vulnerable groups. It focused on strengthening the rural health infrastructure and introduced the Accredited Social Health Activist as a key community health worker. This mission was later integrated into the broader National Health Mission to cover both rural and urban areas.

141. (3) Children, adolescents, and fertile women
Poshan Abhiyan takes a comprehensive approach to reducing anaemia by targeting the most vulnerable groups across the lifecycle. This includes children under six years of age, adolescent boys and girls, and women of reproductive age, particularly pregnant and lactating mothers. By addressing the nutritional needs and health status of these groups, the program aims to break the intergenerational cycle of malnutrition and anaemia.

142. (4) Out-of-pocket costs for catastrophic health events
A central goal of Ayushman Bharat PM-JAY is to provide financial protection to nearly fifty crore vulnerable citizens, thereby reducing the burden of out-of-pocket expenditures on health. Large medical bills for major surgeries or serious illnesses often drive families into poverty. By covering the costs of secondary and tertiary hospitalization, the scheme prevents these catastrophic health events from causing severe economic distress for poor families.

143. (2) I, III, IV and V only
The liver is the body's largest internal organ, and the pancreas serves both endocrine and exocrine functions. Water absorption is a key role of the large intestine, and stomach acid is necessary to activate digestive enzymes like pepsin. However, bile does not contain enzymes to digest proteins; its primary role is the emulsification of fats to facilitate their digestion by pancreatic lipase.

144. (2) Synthesis of blood-clotting proteins
Vitamin K is an essential fat-soluble vitamin that serves as a cofactor for the synthesis of several proteins required for blood coagulation. Without sufficient Vitamin K, the blood cannot clot properly, leading to an increased risk of excessive bleeding and bruising. While it also plays a role in bone health, its most critical and well-known function is ensuring the body's ability to stop bleeding after an injury.

145. (2) Phosphorus
Phosphorus is a vital mineral that works closely with calcium to build strong bones and teeth. In fact, about eighty-five percent of the body's phosphorus is found in the skeletal system in the form of calcium phosphate. Beyond its structural role, phosphorus is also essential for energy production, as it is a key component of ATP, and for the formation of DNA and cell membranes.

146. (2) 350 kcal
During the second and third trimesters of pregnancy, the body requires additional energy to support the growth of the fetus, placenta, and maternal tissues. Nutritional guidelines generally recommend an increase of approximately three hundred and fifty kilocalories per day above the woman's pre-pregnancy needs. Meeting these increased energy requirements is important for ensuring healthy weight gain and the optimal development of the developing baby.

147. (3) Imbalance between energy intake and expenditure
Obesity is fundamentally the result of a long-term energy imbalance where more calories are consumed than are expended through basal metabolism and physical activity. The excess energy is stored in the body as adipose tissue. While genetics and environmental factors play a role, the chronic surplus of energy intake remains the primary driver of weight gain and the development of obesity in individuals.

NODIA

one state can receive cashless treatment at any empanelled public or private hospital in another state. This feature is especially beneficial for migrant workers and families who may need medical care while away from their home district or state.

183. (4) I, II, III, IV and V
The National Health Mission serves as an umbrella program that encompasses various national disease control initiatives. This includes programs for the control of vector-borne diseases, tuberculosis, and leprosy. Additionally, it integrates efforts for mental health care and the prevention of blindness. This comprehensive structure allows for a more coordinated approach to public health, ensuring that diverse health challenges are addressed through a unified administrative and financial framework.

184. (1) Pellagra
Pellagra is a nutritional deficiency disease caused by a severe lack of niacin (Vitamin B3) or the amino acid tryptophan. It is historically characterized by the "four Ds": dermatitis, which affects sun-exposed skin; diarrhea; dementia, involving cognitive impairment; and eventually death if left untreated. Pellagra was once common in populations where corn was the primary dietary staple and was not properly processed to release the niacin.

185. (3) Increased risk of severe and prolonged diarrhea
Zinc is a critical micronutrient for immune system function and the integrity of the intestinal lining. A deficiency in zinc impairs the body's ability to fight infections, particularly in the digestive tract. This significantly increases the risk, severity, and duration of diarrheal episodes in children. Consequently, zinc supplementation is a standard recommendation for the management of acute diarrhea, helping to reduce its impact and prevent further complications.

186. (1) Iron and Folic Acid (IFA)
The combination of iron and folic acid is universally recommended for pregnant women to ensure a healthy pregnancy and prevent maternal anaemia. Iron is essential for making haemoglobin to carry oxygen to the fetus, while folic acid is crucial for the early development of the baby's brain and spinal cord. Regular supplementation significantly reduces the risk of low birth weight and other complications for both mother and child.

187. (4) Inadequate weight for a given height
Wasting is a form of acute malnutrition that reflects a recent and severe process of weight loss, often associated with acute starvation or severe disease. It is clinically defined by a low weight-for-height ratio. Wasting can be life-threatening as it significantly increases a child's susceptibility to infections. Identifying and treating wasting promptly is a major priority in public health programs aimed at reducing child mortality and improving nutritional outcomes.

188. (2) Chilli powder
Chilli powder is sometimes adulterated with illegal synthetic dyes like Sudan red to enhance its color and make it look more appealing to consumers. Sudan red is a chemical dye used primarily in industrial applications and is classified as a carcinogen. Its presence in food is strictly prohibited by food safety regulations globally because even small amounts can pose long-term health risks, including an increased risk of cancer.

189. (3) Inactivating enzymes that cause flavor and color loss
Blanching is a short heat treatment where vegetables are immersed in boiling water or steam for a brief period before being rapidly cooled. This process is essential for inactivating enzymes that would otherwise continue to cause the deterioration of flavor, color, and texture during frozen or canned storage. Blanching also helps clean the surface of the vegetables and softens the tissue, making them easier to package.

190. (4) FSSAI
The "Eat Right India" movement is a flagship initiative led by the Food Safety and Standards Authority of India. Its goal is to transform the national food system by promoting safe, healthy, and sustainable eating habits among the population. The movement focuses on three key pillars: eating safe, eating healthy, and eating sustainably. It involves a wide range of stakeholders to create a culture of food safety and wellness.

Downloaded from www.pdf.tube

191. (1) Carbohydrates
The digestion of carbohydrates begins in the mouth, where the enzyme salivary amylase starts breaking down complex starches into simpler sugars. Mechanical chewing also helps by increasing the surface area of the food. While the digestion of proteins and fats occurs primarily in the stomach and small intestine, respectively, the mouth provides the necessary environment for the initial chemical breakdown of starchy foods during the process of mastication.

192. (2) Macrophages
Macrophages are vital components of the innate immune system that function as the body's primary scavenger cells. They move throughout the tissues, engulfing and digesting cellular debris, foreign substances, and invading microorganisms through the process of phagocytosis. By clearing away dead cells and potentially harmful pathogens, macrophages play a crucial role in maintaining tissue health and initiating the healing process after an injury or an infection has occurred.

193. (2) Messenger RNA (mRNA)
The Pfizer-BioNTech and Moderna Covid-19 vaccines utilized a groundbreaking technology called messenger RNA. Instead of using a weakened or killed virus, these vaccines provide the body's cells with genetic instructions to produce a harmless piece of the virus's spike protein. This protein then triggers an immune response, leading to the production of antibodies and the development of immunological memory, providing highly effective protection against the actual virus if it is encountered.

194. (1) Liver
Hepatitis is a general term for inflammation of the liver, which can be caused by various factors, most commonly viral infections. The different types of viral hepatitis, such as A, B, and C, are caused by different viruses and have different modes of transmission. When the liver is inflamed, its ability to function correctly is impaired, which can lead to symptoms like jaundice, fatigue, and, in severe chronic cases, liver cirrhosis or cancer.

195. (3) Resistance to at least one second-line injectable
Extensively Drug-Resistant Tuberculosis is a severe form of the disease that is much more difficult to treat than ordinary multi-drug resistant TB. It is defined as resistance to at least isoniazid and rifampicin, plus resistance to any fluoroquinolone and at least one of the three second-line injectable drugs. This high level of resistance significantly limits the treatment options available, requiring the use of newer and often more expensive medications.

196. (4) Kala-azar - Sandfly
Kala-azar, also known as visceral leishmaniasis, is a parasitic disease transmitted to humans through the bite of infected female phlebotomine sandflies. In contrast, dengue is primarily transmitted by Aedes mosquitoes, while malaria is spread by female Anopheles mosquitoes. Identifying the correct vector for each disease is fundamental for implementing effective vector control strategies, such as the use of insecticide-treated nets or indoor residual spraying to prevent infection.

197. (1) A-iv, B-i, C-ii, D-iii
The Rashtriya Bal Swasthya Karyakram focuses on screening children for various health conditions, known as the "4 Ds." The Rashtriya Kishor Swasthya Karyakram is specifically designed to address the health needs of adolescents. The NPHCE provides dedicated healthcare for the elderly population, and the PMSMA ensures that all pregnant women receive comprehensive and quality antenatal care, particularly during their second and third trimesters.

198. (2) Systolic pressure
In a blood pressure reading, the first or higher number represents the systolic pressure. This is the pressure exerted on the artery walls when the heart beats and pumps blood into the system. The second or lower number represents the diastolic pressure, which is the pressure when the heart is at rest between beats. Monitoring both numbers is essential for diagnosing hypertension and assessing the overall health of the cardiovascular system.

NODIA

199. (4) To offer free 24x7 tele-mental health services and counseling

Tele-MANAS, which stands for Tele-Mental Health Assistance and Networking Across States, was launched to provide comprehensive mental health support throughout India. It offers a 24x7 toll-free helpline where individuals can receive immediate counseling and support from trained mental health professionals. This initiative is particularly important for improving access to care in remote areas and for providing a safe and confidential way for people to seek help for mental health concerns.

200. (3) 12

Ayushman Bharat Health and Wellness Centres are designed to provide a comprehensive package of twelve essential primary healthcare services. These services go beyond basic maternal and child health to include the management of non-communicable diseases, mental health, and emergency medical services. By offering this expanded range of services, the centres aim to provide holistic and continuous care for all members of the community, significantly strengthening the primary healthcare system.

www.nodia.in

Click Here to Buy book on Amazon

19. A species that plays a critical role in maintaining the structure of an ecological community is termed as:
(1) Indicator species
(2) Endemic species
(3) Keystone species
(4) Invasive species
(5) Question not attempted

20. Why do food chains rarely have more than four or five trophic levels?
(1) Lack of biodiversity in upper levels
(2) Slow reproduction rates in apex predators
(3) Toxin accumulation killing higher organisms
(4) Rapid loss of energy at successive levels
(5) Question not attempted

21. Which of the following is not a gaseous biogeochemical cycle?
(1) Nitrogen cycle
(2) Carbon cycle
(3) Phosphorus cycle
(4) Water cycle
(5) Question not attempted

22. The major reservoir of carbon in the Earth's system is found in:
(1) The atmosphere
(2) The oceans
(3) Terrestrial biosphere
(4) Fossil fuels
(5) Question not attempted

23. Consider the following processes regarding the carbon cycle:
I. Photosynthesis
II. Respiration
III. Volcanic eruption
IV. Fossil fuel combustion
Which of the above process(es) add(s) carbon dioxide to the atmosphere?
(1) I, II and III
(2) II, III and IV
(3) I, III and IV
(4) I, II, III and IV
(5) Question not attempted

24. Which group of bacteria is responsible for converting nitrites to nitrates in the nitrogen cycle?
(1) Nitrobacter
(2) Nitrosomonas
(3) Rhizobium
(4) Pseudomonas
(5) Question not attempted

25. The process of converting atmospheric nitrogen into ammonia by biological or physical methods is called:
(1) Denitrification
(2) Ammonification
(3) Nitrogen fixation
(4) Nitrification
(5) Question not attempted

NODIA

26. Denitrification is an essential step in the nitrogen cycle. What is its primary function?
(1) Returning nitrogen gas to the atmosphere
(2) Converting atmospheric nitrogen to ammonia
(3) Oxidizing ammonia to form various nitrites
(4) Assimilating nitrates into plant proteins
(5) Question not attempted

27. The driving force for the global hydrological (water) cycle is:
(1) Earth's geothermal heat
(2) Gravitational pull of the moon
(3) Coriolis force
(4) Solar radiation
(5) Question not attempted

28. Which component is entirely absent from the atmospheric phase of its biogeochemical cycle?
(1) Nitrogen
(2) Phosphorus
(3) Oxygen
(4) Sulfur
(5) Question not attempted

29. Select the correct sequence of water cycle processes starting from the oceans:
(1) Precipitation → Condensation → Evaporation → Runoff
(2) Evaporation → Condensation → Precipitation → Runoff
(3) Condensation → Evaporation → Precipitation → Runoff
(4) Runoff → Precipitation → Condensation → Evaporation
(5) Question not attempted

9. In a standard ecological pyramid, which parameter can never be inverted in a functional ecosystem?
(1) Pyramid of numbers
(2) Pyramid of biomass
(3) Pyramid of energy
(4) Pyramid of species richness
(5) Question not attempted

10. The concept of "Ecological Niche" was primarily developed by which of the following ecologists?
(1) Joseph Grinnell
(2) A.G. Tansley
(3) Ernst Haeckel
(4) Eugene Odum
(5) Question not attempted

11. In a grazing food chain, the first trophic level is always occupied by:
(1) Herbivores
(2) Carnivores
(3) Detritivores
(4) Autotrophs
(5) Question not attempted

12. Regarding food webs, consider the following statements:
I. A food web provides multiple alternative pathways for energy flow.
II. Food webs decrease the ecological stability of an ecosystem.
III. It consists of multiple interconnected food chains.
Which of the above statement(s) is/are correct?
(1) I and II only
(2) II and III only
(3) I and III only
(4) I, II and III
(5) Question not attempted

13. According to Lindeman's ten percent law, if 10,000 Joules of solar energy falls on green plants, how much energy is transferred to the primary consumers?
(1) 1,000 Joules
(2) 100 Joules
(3) 10 Joules
(4) 1 Joule
(5) Question not attempted

14. Which type of food chain begins with dead organic matter?
(1) Grazing food chain
(2) Parasitic food chain
(3) Aquatic food chain
(4) Detritus food chain
(5) Question not attempted

15. Bioaccumulation refers to the accumulation of toxic substances at what level?
(1) Within a single organism over its lifetime
(2) Within the abiotic environment
(3) Progressively higher across multiple trophic levels
(4) Exclusively in primary producers
(5) Question not attempted

16. In an aquatic ecosystem, what is the usual shape of the pyramid of biomass?
(1) Upright
(2) Inverted
(3) Spindle-shaped
(4) Rectangular
(5) Question not attempted

17. Biomagnification is most commonly associated with which of the following substances?
(1) Nitrogen and Phosphorus
(2) DDT and Mercury
(3) Carbon dioxide
(4) Calcium and Magnesium
(5) Question not attempted

18. Match List I with List II regarding components of a grassland ecosystem:
List I: (Trophic Level)
A. First Trophic Level
B. Second Trophic Level
C. Third Trophic Level
D. Fourth Trophic Level
List II: (Example in Grassland Ecosystem)
i. Frog
ii. Snake
iii. Grass
iv. Grasshopper
(1) A-iii, B-iv, C-i, D-ii
(2) A-iv, B-iii, C-ii, D-i
(3) A-iii, B-i, C-iv, D-ii
(4) A-ii, B-iii, C-i, D-iv
(5) Question not attempted

NODIA

CHAPTER 06

Environmental & Ecological Changes and Their Impact Assessment

1. Which of the following best defines an ecosystem?
(1) A purely biological community of interacting organisms
(2) Interacting organisms and their physical environment
(3) Specific geographical area with weather patterns
(4) Biome consisting of terrestrial flora and fauna
(5) Question not attempted

2. Which among the following is not classified as an abiotic component of an ecosystem?
(1) Decomposers
(2) Temperature
(3) Sunlight
(4) Soil minerals
(5) Question not attempted

3. What is an ecotone in the context of ecosystems?
(1) The deepest part of a marine ecosystem
(2) A species with large effects on its environment
(3) A zone of transition between diverse ecosystems
(4) The total biomass present in a trophic level
(5) Question not attempted

4. Which of the following represents a functional aspect of an ecosystem?
(1) Species composition
(2) Stratification
(3) Trophic structure
(4) Nutrient cycling
(5) Question not attempted

5. Identify the incorrect statement regarding the types of ecosystems.
(1) Estuaries are examples of natural aquatic ecosystems.
(2) A forest is a naturally occurring terrestrial ecosystem.
(3) Crop fields are considered natural terrestrial ecosystems.
(4) An aquarium is an artificial or man-made ecosystem.
(5) Question not attempted

6. In an ecosystem, which organisms are primarily responsible for converting complex organic matter into simple inorganic substances?
(1) Primary consumers
(2) Saprotrophs
(3) Autotrophs
(4) Apex predators
(5) Question not attempted

7. The rate at which organic matter is created by producers in an ecosystem is known as:
(1) Secondary productivity
(2) Net primary productivity
(3) Ecological efficiency
(4) Gross primary productivity
(5) Question not attempted

8. Given below are two statements, one is labelled as Assertion (A) and the other as Reason (R):
Assertion (A): Energy flow in an ecosystem is always strictly unidirectional.
Reason (R): Energy captured by autotrophs does not revert back to solar input.
(1) Both A and R are true and R is the correct explanation of A.
(2) Both A and R are true but R is not the correct explanation of A.
(3) A is true but R is false.
(4) A is false but R is true.
(5) Question not attempted

Downloaded from www.pdf.tube

30. Through which biological process do plants release water vapor into the atmosphere?
(1) Sublimation
(2) Percolation
(3) Precipitation
(4) Transpiration
(5) Question not attempted

31. Environmental pollution can be broadly defined as:
(1) Adding substances to environment faster than dispersal
(2) Introducing native species into a new habitat
(3) Natural breakdown of organic materials in soil
(4) Seasonal variation in the atmospheric temperature
(5) Question not attempted

32. Which of the following is classified as a secondary pollutant?
(1) Carbon monoxide (CO)
(2) Ground-level Ozone (O_3)
(3) Sulfur dioxide (SO_2)
(4) Particulate matter (PM10)
(5) Question not attempted

33. Non-point source pollution refers to:
(1) Pollution from a single identifiable pipe
(2) Pollution from diffuse and widespread sources
(3) Industrial effluent into a specific lake
(4) A localized oil spill in the deep ocean
(5) Question not attempted

34. Match List I with List II regarding types of pollution and their common causes:
List I: (Type of Pollution)
A. Air Pollution
B. Water Pollution
C. Soil Pollution
D. Noise Pollution
List II: (Common Source/Cause)
i. Agricultural runoff
ii. Excessive use of agrochemicals
iii. Jet engine take-off
iv. Incomplete combustion of fossil fuels
(1) A-iv, B-i, C-ii, D-iii
(2) A-i, B-ii, C-iv, D-iii
(3) A-iv, B-ii, C-i, D-iii
(4) A-ii, B-iv, C-i, D-iii
(5) Question not attempted

35. The term 'smog' was originally coined to describe a mixture of:
(1) Snow and fog
(2) Soot and gas
(3) Smoke and fog
(4) Sulfur and oxygen
(5) Question not attempted

NODIA

36. Identify the incorrect statement regarding pollutants.
(1) Biodegradable pollutants are broken down by microbial action.
(2) Non-biodegradable pollutants persist in the environment for long periods.
(3) Primary pollutants are directly emitted from sources.
(4) DDT is a classic example of a biodegradable pollutant.
(5) Question not attempted

37. Which unit is primarily used to measure the intensity of noise pollution?
(1) Hertz
(2) Dobson
(3) Decibel
(4) Becquerel
(5) Question not attempted

38. Consider the following statements about persistent organic pollutants (POPs):
I. They remain intact in the environment for long periods.
II. They become widely distributed geographically.
III. They accumulate in the fatty tissue of living organisms.
IV. They are highly water-soluble.
V. They are toxic to humans and wildlife.
Which of the above statement(s) is/are correct?
(1) I, II, III and V
(2) II, III, IV and V
(3) I, III, IV and V
(4) I, II, III, IV and V
(5) Question not attempted

39. Thermal pollution in water bodies is primarily caused by:
(1) Release of cold water from deep dams

(2) Eutrophication due to runoff fertilizers
(3) Acid rain lowering surface water pH
(4) Discharge of heated water from power plants
(5) Question not attempted

40. Which of the following diseases is primarily associated with noise pollution?
(1) Hypertension
(2) Cholera
(3) Silicosis
(4) Fluorosis
(5) Question not attempted

41. Which gas binds with hemoglobin in the blood to reduce its oxygen-carrying capacity?
(1) Carbon dioxide
(2) Sulfur dioxide
(3) Carbon monoxide
(4) Nitrogen dioxide
(5) Question not attempted

42. The main components responsible for the formation of acid rain are:
(1) Sulfur dioxide and Nitrogen oxides
(2) Carbon monoxide and Carbon dioxide
(3) Methane and Ozone
(4) Chlorofluorocarbons and Ammonia
(5) Question not attempted

43. Particulate Matter (PM) 2.5 is particularly dangerous to human health because:
(1) It contains high levels of radioactivity
(2) It directly destroys the ozone layer
(3) It causes immediate skin surface burning
(4) It enters the blood via natural defenses
(5) Question not attempted

44. Photochemical smog is characterized by the presence of which secondary pollutant?
(1) Carbon monoxide
(2) Peroxyacetyl nitrate (PAN)
(3) Sulfur dioxide
(4) Lead
(5) Question not attempted

45. Regarding indoor air pollution, consider the following statements:
I. Radon gas is a natural source of indoor air pollution.
II. Biomass burning in rural kitchens is a major cause in developing countries.
III. Indoor air pollution cannot cause chronic obstructive pulmonary disease (COPD).
Which of the above statement(s) is/are correct?
(1) I and II only
(2) II and III only
(3) I and III only
(4) I, II and III
(5) Question not attempted

46. The National Air Quality Index (AQI) in India considers how many pollutants for measurement?
(1) Six
(2) Eight
(3) Ten
(4) Twelve
(5) Question not attempted

47. Which of the following is an occupational respiratory disease common among coal miners?
(1) Pneumoconiosis (Black lung disease)
(2) Byssinosis
(3) Asbestosis
(4) Silicosis
(5) Question not attempted

48. Fly ash is a major environmental pollutant generated primarily by:
(1) Cement industries
(2) Thermal power plants using coal
(3) Petroleum refineries
(4) Fertilizer industries
(5) Question not attempted

49. The 'Air (Prevention and Control of Pollution) Act' was enacted in India in which year?
(1) 1974
(2) 1981
(3) 1986
(4) 1992
(5) Question not attempted

50. Which of the following technologies is used in smokestacks to reduce particulate matter emissions?
(1) Electrostatic precipitators
(2) Catalytic converters
(3) Reverse osmosis
(4) Activated sludge process
(5) Question not attempted

Click Here to Buy book on Amazon

51. Given below are two statements, one is labelled as Assertion (A) and the other as Reason (R):
Assertion (A): Excessive discharge of nutrients into lakes leads to a decrease in dissolved oxygen.
Reason (R): Nutrient enrichment promotes rapid algal blooms, which consume oxygen upon death and decomposition.
(1) Both A and R are true and R is the correct explanation of A.
(2) Both A and R are true but R is not the correct explanation of A.
(3) A is true but R is false.
(4) A is false but R is true.
(5) Question not attempted

52. Eutrophication of water bodies is predominantly caused by an excess of:
(1) Heavy metals
(2) Dissolved oxygen
(3) Calcium and Magnesium
(4) Nitrogen and Phosphorus
(5) Question not attempted

53. Biochemical Oxygen Demand (BOD) is a measure of:
(1) Total volume of dissolved oxygen in a body
(2) Oxygen needed by plants for photosynthesis
(3) Oxygen needed by bacteria for decomposition
(4) Amount of chemicals in industrial effluents
(5) Question not attempted

54. Minamata disease is a neurological syndrome caused by severe poisoning of:
(1) Lead
(2) Methylmercury
(3) Arsenic
(4) Cadmium
(5) Question not attempted

55. What is the primary purpose of the 'Activated Sludge Process' in wastewater treatment?
(1) Primary removal of large floating debris
(2) Tertiary treatment to remove heavy metals
(3) Disinfection using ultraviolet light systems
(4) Secondary treatment to reduce organic matter
(5) Question not attempted

56. High concentrations of fluoride in drinking water cause which of the following conditions?
(1) Skeletal fluorosis
(2) Itai-Itai disease
(3) Blue Baby Syndrome
(4) Cholera
(5) Question not attempted

57. Which of the following correctly pairs a water pollutant with its associated health effect?
(1) Cadmium - Minamata disease
(2) Mercury - Itai-Itai disease
(3) Nitrate - Methemoglobinemia
(4) Arsenic - Fluorosis
(5) Question not attempted

58. Match List I with List II regarding wastewater treatment:
List I: (Wastewater Treatment Stage)
A. Primary Treatment
B. Secondary Treatment
C. Tertiary Treatment
D. Disinfection
List II: (Associated Process)
i. Biological degradation of organic matter
ii. Chlorination or UV radiation
iii. Physical settling and screening
iv. Advanced nutrient and chemical removal
(1) A-iii, B-i, C-iv, D-ii
(2) A-i, B-iii, C-iv, D-ii
(3) A-iii, B-iv, C-i, D-ii
(4) A-ii, B-i, C-iv, D-iii
(5) Question not attempted

59. The 'Ganga Action Plan' in India was launched primarily to:
(1) Build hydroelectric dams on the river
(2) Promote river-based commercial transport
(3) Interlink the Ganga with southern rivers
(4) Improve water quality via sewage treatment
(5) Question not attempted

60. The presence of coliform bacteria in a water sample indicates:
(1) High levels of dissolved oxygen
(2) Fecal contamination
(3) Salinity intrusion
(4) Heavy metal pollution
(5) Question not attempted

61. Salinization of soil is primarily a consequence of:
(1) Over-application of organic compost

NODIA

(5) Question not attempted

82. Match List I with List II regarding climate change concepts:
List I: (Climate Concept)
A. Mitigation
B. Adaptation
C. Climate Finance
D. Carbon Sequestration
List II: (Description)
i. Process of capturing and storing atmospheric CO_2
ii. Adjusting to actual or expected future climate effects
iii. Reducing the flow of heat-trapping greenhouse gases
iv. Local, national or transnational funding to support climate actions
(1) A-iii, B-ii, C-iv, D-i
(2) A-ii, B-iii, C-i, D-iv
(3) A-iii, B-iv, C-ii, D-i
(4) A-i, B-ii, C-iv, D-iii
(5) Question not attempted

83. The primary goal of the Paris Agreement (2015) is to limit the global temperature increase in this century to:
(1) Below 2 degrees, ideally 1.5 degrees
(2) 3 degrees above pre-industrial levels
(3) 1 degree compared to 1990 levels
(4) Zero warming by the year 2050
(5) Question not attempted

84. 'Nationally Determined Contributions' (NDCs) are a key element of which international agreement?
(1) Montreal Protocol
(2) Convention on Biological Diversity
(3) Ramsar Convention
(4) Paris Agreement
(5) Question not attempted

85. Which of the following is considered an adaptation measure rather than a mitigation measure in climate change?
(1) Expanding solar energy infrastructure
(2) Implementing various carbon taxes
(3) Building sea walls to protect coasts
(4) Regional afforestation programs
(5) Question not attempted

86. The Intergovernmental Panel on Climate Change (IPCC) was established by:
(1) UNESCO and WHO
(2) UNEP and WMO
(3) World Bank and IMF
(4) IUCN and WWF
(5) Question not attempted

87. Regarding the impacts of climate change, consider the following statements:
I. It leads to the shifting of climatic zones and altered rainfall patterns.
II. It results in the global decrease of sea levels.
III. It increases the frequency of extreme weather events like hurricanes and droughts.
Which of the above statement(s) is/are correct?
(1) I and II only
(2) I and III only
(3) II and III only
(4) I, II and III
(5) Question not attempted

88. What does "Net Zero" emission mean in the context of climate change?
(1) Balancing emissions with gas removal
(2) Total cessation of economic activities
(3) Using only renewable energy sources
(4) Elimination of atmospheric carbon dioxide
(5) Question not attempted

89. Ocean acidification, often called the "evil twin" of climate change, is caused by:
(1) Increased runoff of agricultural fertilizers
(2) Offshore oil spills in the deep oceans
(3) Absorption of carbon dioxide by oceans
(4) Thermal pollution from power plants
(5) Question not attempted

90. Which of the following represents the odd one out regarding India's declared climate targets (Panchamrit) at COP26?
(1) Achieve the target of Net Zero by 2050
(2) Reach non-fossil energy capacity of 500 GW by 2030
(3) Meet 50% of energy requirements from renewable energy by 2030
(4) Reduce total projected carbon emissions by one billion tonnes from now onwards till 2030
(5) Question not attempted

Downloaded from www.pdf.tube

72. Regarding the potential for natural biodegradation of plastics, consider the following:
A. PET (Polyethylene Terephthalate)
B. PHA (Polyhydroxyalkanoate)
C. Glass
D. PLA (Polylactic Acid)
Which of the following represents the correct sequence in increasing order of biodegradation potential?
(1) C, A, D, B
(2) A, D, B, C
(3) C, D, A, B
(4) A, B, D, C
(5) Question not attempted

73. Primary microplastics are:
(1) Formed from the breakdown of larger debris
(2) Generated from the wear of automobile tires
(3) Manufactured at microscopic sizes for products
(4) The result of burning various plastic waste
(5) Question not attempted

74. Which of the following international agreements governs the transboundary movement of hazardous wastes, explicitly including certain plastic wastes?
(1) Basel Convention
(2) Kyoto Protocol
(3) Montreal Protocol
(4) Paris Agreement
(5) Question not attempted

75. The 'Great Pacific Garbage Patch' is primarily an accumulation of:
(1) Industrial chemical sludge
(2) Radioactive waste disposal
(3) Discarded electronic waste
(4) Marine debris and plastics
(5) Question not attempted

76. Why is plastic pollution considered a severe threat to marine life?
(1) Animals lower the salinity of the ocean
(2) Animals mistake plastics for food items
(3) Plastics cause acidification of seawater
(4) Plastics trigger harmful algal blooms
(5) Question not attempted

77. The term "single-use plastics" refers to:
(1) Plastics that can only be recycled once
(2) Plastics used strictly for medical purposes
(3) Items used once before disposal
(4) Biodegradable plastics made from starch
(5) Question not attempted

78. In India, the manufacture, import, stocking, distribution, sale and use of identified single-use plastic items were banned from which date?
(1) 1st January 2021
(2) 1st July 2022
(3) 2nd October 2019
(4) 5th June 2023
(5) Question not attempted

79. Regarding Extended Producer Responsibility (EPR) in plastic waste management, consider the following statements:
I. EPR shifts the responsibility of waste management physically and financially to the producer.
II. EPR encourages manufacturers to design environmentally friendly products.
III. It does not apply to brand owners and importers.
IV. It aims to increase recycling rates.
V. It was mandated in India under the Plastic Waste Management Rules, 2016.
Which of the above statement(s) is/are correct?
(1) I, II, IV and V
(2) II, III, IV and V
(3) I, III, IV and V
(4) I, II, III and V
(5) Question not attempted

80. Nurdles, a significant source of plastic pollution on beaches, are:
(1) Synthetic fibers from washing machines
(2) Plastic pellets used in manufacturing
(3) Discarded nets from fishing activity
(4) Microbeads from cosmetic products
(5) Question not attempted

81. The United Nations Framework Convention on Climate Change (UNFCCC) was adopted during which landmark event?
(1) The Stockholm Conference, 1972
(2) The Earth Summit in Rio de Janeiro, 1992
(3) The Kyoto Conference, 1997
(4) The Paris Climate Conference, 2015

NODIA

(2) Heavy rainfall and subsequent leaching
(3) Intensive irrigation in arid regions
(4) Planting deep-rooted tree species
(5) Question not attempted

62. Bioremediation is defined as:
(1) Use of chemical solvents for washing soil
(2) Process of burning soil to remove pollutants
(3) Application of lime to highly acidic soils
(4) Use of living organisms to degrade contaminants
(5) Question not attempted

63. Which agricultural practice is a major contributor to soil pollution?
(1) Excessive use of synthetic pesticides and fertilizers
(2) Crop rotation
(3) Organic farming
(4) Contour plowing
(5) Question not attempted

64. Phytoremediation utilizes which of the following to clean up soil pollution?
(1) Fungi
(2) Plants
(3) Bacteria
(4) Earthworms
(5) Question not attempted

65. Identify the incorrect statement regarding soil pollution.
(1) Industrial mining activities are a major source of heavy metal contamination in soils.
(2) Biochar application always increases the toxicity of agricultural soils.
(3) Acid rain can alter soil pH and negatively impact soil microbes.
(4) Plastic waste can break down into microplastics in the soil.
(5) Question not attempted

66. Regarding soil remediation, consider the following statements:
I. Ex-situ remediation involves treating the contaminated soil at the site without excavation.
II. Soil washing is a physical/chemical remediation technique.
III. In-situ techniques are generally less expensive than ex-situ techniques.
IV. Thermal desorption uses heat to vaporize contaminants from soil.
Which of the above statement(s) is/are correct?
(1) I, II and III
(2) II, III and IV
(3) I, III and IV
(4) I, II and IV
(5) Question not attempted

67. The excessive accumulation of which element in the soil leads to sodicity, causing poor soil structure?
(1) Calcium
(2) Potassium
(3) Sodium
(4) Magnesium
(5) Question not attempted

68. Which of the following is an example of an organochlorine pesticide known for persisting in soil?
(1) Malathion
(2) Glyphosate
(3) Parathion
(4) DDT
(5) Question not attempted

69. Solid waste dumping in open landfills most directly pollutes the soil and groundwater through the generation of:
(1) Methane gas
(2) Fly ash
(3) Leachate
(4) Smog
(5) Question not attempted

70. Vermicomposting is a process that:
(1) Degrades plastic polymers using enzymes
(2) Uses earthworms to convert organic waste
(3) Sterilizes soil using frequency radiation
(4) Neutralizes alkaline soils by adding sulfur
(5) Question not attempted

71. Microplastics are generally defined as plastic particles smaller than:
(1) 1 millimeter
(2) 5 millimeters
(3) 10 millimeters
(4) 50 millimeters
(5) Question not attempted

Click Here to Buy book on Amazon

91. The greenhouse effect refers to:
(1) Cooling of surface due to cloud cover
(2) Depletion of ozone allowing UV radiation
(3) Artificial cultivation in glass houses
(4) Trapping of heat by atmospheric gases
(5) Question not attempted

92. Which of the following greenhouse gases has the highest Global Warming Potential (GWP) per molecule?
(1) Carbon dioxide
(2) Sulfur hexafluoride
(3) Methane
(4) Nitrous oxide
(5) Question not attempted

93. Consider the following greenhouse gases and their contribution to the natural greenhouse effect:
A. Methane
B. Water vapor
C. Carbon dioxide
Which of the following represents the correct sequence in decreasing order of overall contribution?
(1) B, C, A
(2) C, B, A
(3) A, C, B
(4) B, A, C
(5) Question not attempted

94. Global warming is best defined as:
(1) Seasonal variations in temperature
(2) Local heating due to concrete structures
(3) Volcanic activity warming the oceans
(4) Long-term heating of climate system
(5) Question not attempted

95. Albedo effect is crucial in global warming discussions. What happens when Arctic sea ice melts?
(1) Albedo decreases, increasing absorption
(2) Albedo increases, leading to cooling
(3) Albedo remains constant for the ice
(4) Albedo causes freezing of ocean water
(5) Question not attempted

96. Identify the incorrect statement concerning greenhouse gases.
(1) Carbon dioxide is primarily released through the burning of fossil fuels.
(2) Methane is exclusively produced by industrial activities.
(3) Nitrous oxide is emitted from agricultural and industrial activities.
(4) Water vapor acts as a strong positive feedback in global warming.
(5) Question not attempted

97. The melting of permafrost in the Arctic is a major concern because it threatens to release massive amounts of which potent greenhouse gas?
(1) Ozone
(2) Methane
(3) Sulfur dioxide
(4) Chlorofluorocarbons
(5) Question not attempted

98. How do higher global temperatures directly affect sea levels?
(1) Via thermal expansion and ice melting
(2) By increasing the total ocean salinity
(3) By increasing the tectonic movement
(4) By causing more oceanic precipitation
(5) Question not attempted

99. Given below are two statements, one is labelled as Assertion (A) and the other as Reason (R):
Assertion (A): Carbon dioxide is the most significant anthropogenic greenhouse gas despite having a lower global warming potential than methane.
Reason (R): Carbon dioxide is present in the atmosphere in much larger concentrations and persists for a longer duration than methane.
(1) Both A and R are true and R is the correct explanation of A.
(2) Both A and R are true but R is not the correct explanation of A.
(3) A is true but R is false.
(4) A is false but R is true.
(5) Question not attempted

100. Which natural process removes carbon dioxide from the atmosphere, acting as a "sink"?
(1) Volcanic eruptions
(2) Respiration
(3) Weathering of limestone
(4) Photosynthesis
(5) Question not attempted

Downloaded from www.pdf.tube

(1) Lowers flood risks via water usage
(2) Bio-indicator for uranium deposits
(3) Binds soil and provides drought fodder
(4) Timber used for industrial papermaking
(5) Question not attempted

180. Sambhar Lake, a critical ecosystem in Rajasthan, has faced severe ecological threats recently due to:
(1) Eruption of underwater volcanoes
(2) Invasive mangroves choking the lake
(3) Oil spills from commercial shipping
(4) Salt extraction and illegal encroachments
(5) Question not attempted

181. Match List I with List II regarding Ramsar sites in India:
List I: (Ramsar Site in India)
A. Keoladeo National Park
B. Chilika Lake
C. Loktak Lake
D. Vembanad Kol Wetland
List II: (State)
i. Kerala
ii. Manipur
iii. Odisha
iv. Rajasthan
(1) A-iii, B-iv, C-i, D-ii
(2) A-iv, B-iii, C-i, D-ii
(3) A-iv, B-iii, C-ii, D-i
(4) A-ii, B-i, C-iv, D-iii
(5) Question not attempted

182. According to the Ramsar Convention, which of the following is NOT classified as a wetland?
(1) Coastal coral reefs
(2) Marine waters over six meters deep
(3) Regional peatlands
(4) River estuaries
(5) Question not attempted

183. The Montreux Record is a register of wetland sites on the List of Wetlands of International Importance where:
(1) No human activity is ever permitted
(2) Restoration has been fully completed
(3) Only avian species are protected
(4) Likely changes in ecological character
(5) Question not attempted

184. Which of the following Ramsar sites in India is famous for floating phumdis?
(1) Loktak Lake
(2) Wular Lake
(3) Sambhar Lake
(4) Harike Wetland
(5) Question not attempted

185. Wetlands are often referred to as "Nature's Kidneys" because they:
(1) Pump water to higher elevations
(2) Regulate body temperature of fauna
(3) Purify water by trapping pollutants
(4) Extract salt from seawater
(5) Question not attempted

186. Which day is celebrated globally as World Wetlands Day, commemorating the adoption of the Ramsar Convention?
(1) 2nd February
(2) 22nd March
(3) 5th June
(4) 16th September
(5) Question not attempted

187. In Rajasthan, apart from Keoladeo National Park, which is the other recognized Ramsar site?
(1) Pushkar Lake
(2) Nakki Lake
(3) Pichola Lake
(4) Sambhar Lake
(5) Question not attempted

188. Regarding the conservation of wetlands in India, consider the following statements:
I. The National Plan for Conservation of Aquatic Eco-systems (NPCA) is a dedicated scheme for wetland and lake conservation.
II. Wetlands in India are protected under the Wetlands (Conservation and Management) Rules, 2017.
III. The rules prohibit solid waste dumping in wetlands.
IV. Construction of permanent structures within 50 meters of wetlands is freely allowed.
Which of the above statement(s) is/are correct?
(1) I, II and III
(2) II, III and IV
(3) I, III and IV
(4) I, II and IV

NODIA

STUDYING FROM PDFs?

THINK AGAIN.

If you are studying only from PDFs,
you are wasting valuable time.

Research shows that learning from

PRINTED BOOKS has up to

4× HIGHER RETENTION

than studying from screens.

PRINT BOOK = BETTER MEMORY

PDF = LOWER RETENTION

Those who study from **PRINTED BOOKS**
move **AHEAD.**

Others are left **BEHIND**
in competition.

In competitive exams,
being average is not enough.

STAY ONE STEP AHEAD.

111. Desertification is formally defined by the UNCCD as land degradation in which specific areas?
(1) Arid, semi-arid, and dry sub-humid areas
(2) Rainforests and tropical regions
(3) Tundra and taiga ecosystems
(4) High altitude alpine meadows
(5) Question not attempted

112. Which anthropogenic activity is the leading cause of desertification globally?
(1) Urban sprawl
(2) Overgrazing by livestock
(3) Deep-sea mining
(4) Construction of dams
(5) Question not attempted

113. The "Great Green Wall" is a monumental project aimed at combating desertification in which region?
(1) The Gobi Desert, China
(2) The Sahel region, Africa
(3) The Thar Desert, India
(4) The Atacama Desert, South America
(5) Question not attempted

114. What is a common soil consequence of poor irrigation practices in arid areas that contributes to desertification?
(1) Soil salinization
(2) Increased soil organic matter
(3) Enhanced nitrogen fixation
(4) Increased water retention capacity
(5) Question not attempted

115. Which UN convention specifically addresses the issue of desertification?
(1) UNFCCC
(2) CBD
(3) UNCCD
(4) CITES
(5) Question not attempted

116. Match List I with List II regarding mechanisms against desertification:
List I: (Control Measure)
A. Shelterbelts
B. Sand dune stabilization
C. Crop rotation
D. Terracing
List II: (Mechanism against Desertification)
i. Prevents soil erosion on steep slopes
ii. Rows of trees planted to reduce wind speed
iii. Planting grasses to bind loose sand
iv. Maintains soil fertility and structure over seasons
(1) A-iii, B-ii, C-i, D-iv
(2) A-ii, B-iv, C-iii, D-i
(3) A-i, B-iii, C-ii, D-iv
(4) A-ii, B-iii, C-iv, D-i
(5) Question not attempted

117. How does desertification impact the global climate?
(1) It cools the planet via sunlight reflection
(2) It increases the global cloud cover
(3) It releases stored carbon from soil
(4) It enhances global rainfall patterns
(5) Question not attempted

118. Which of the following states in India has the highest proportion of its geographical area under desertification/land degradation?
(1) Gujarat
(2) Rajasthan
(3) Maharashtra
(4) Madhya Pradesh
(5) Question not attempted

119. Identify the incorrect statement regarding desertification.
(1) It leads to a decline in land productivity.
(2) Climate change and human activities are the primary drivers.
(3) Loss of vegetation cover is a key indicator of the process.
(4) It refers primarily to the expansion of existing deserts into non-desert areas.
(5) Question not attempted

120. The concept of "Land Degradation Neutrality" (LDN) implies:
(1) Maintaining healthy land resources
(2) Halting all global agricultural activities
(3) Replacing degraded land with synthetics
(4) Stopping all terrestrial mining acts
(5) Question not attempted

121. Regarding deforestation, consider the following statements:
I. It alters local microclimates and reduces rainfall.

Click Here to Buy book on Amazon

II. It is a major driver of biodiversity loss.
III. It decreases the concentration of carbon dioxide in the atmosphere.
IV. It exacerbates soil erosion and flooding.
V. Expansion of commercial agriculture is a leading cause.

Which of the above statement(s) is/are correct?
(1) I, II, III and V
(2) I, II, IV and V
(3) II, III, IV and V
(4) I, II, III, IV and V
(5) Question not attempted

122. "Slash-and-burn" agriculture, which contributes heavily to deforestation in tropical areas, is also known in India as:
(1) Jhum cultivation
(2) Intensive subsistence farming
(3) Plantation agriculture
(4) Mixed farming
(5) Question not attempted

123. The REDD+ initiative is a global effort primarily aimed at:
(1) Regulating extreme weather events
(2) Restoring endangered marine species
(3) Removing excessive dams on rivers
(4) Reducing emissions from deforestation
(5) Question not attempted

124. Deforestation directly affects the water cycle by:
(1) Increasing groundwater recharge
(2) Reducing precipitation via evapotranspiration
(3) Increasing humidity of surrounding air
(4) Increasing soil capacity to hold moisture
(5) Question not attempted

125. The term 'Afforestation' refers to:
(1) Planting trees in recently lost forest
(2) Natural regeneration without intervention
(3) Planting trees where none existed recently
(4) Commercial logging of mature trees
(5) Question not attempted

126. Which specific global initiative aims to restore 350 million hectares of deforested and degraded land by 2030?
(1) The Kyoto Protocol
(2) The Stockholm Convention
(3) The Aichi Targets
(4) The Bonn Challenge
(5) Question not attempted

127. Consider the following events following large-scale deforestation in a tropical region:
1. Increased soil erosion
2. Loss of topsoil
3. Reduced agricultural productivity

Which of the following represents the correct sequence of impacts?
(1) $1 \rightarrow 2 \rightarrow 3$
(2) $3 \rightarrow 2 \rightarrow 1$
(3) $2 \rightarrow 1 \rightarrow 3$
(4) $1 \rightarrow 3 \rightarrow 2$
(5) Question not attempted

128. Illegal logging is often driven by the high international demand for:
(1) Firewood
(2) Tropical timber and valuable hardwoods
(3) Fruit-bearing trees
(4) Bamboo
(5) Question not attempted

NODIA

129. How does deforestation contribute to the outbreak of zoonotic diseases?
(1) By destroying viruses present in soil
(2) By increasing human and wildlife contact
(3) By increasing habitat for wild animals
(4) By reducing global temperature levels
(5) Question not attempted

130. The "Chipko Movement," originating in Uttarakhand, was primarily a grassroots movement for:
(1) Forest conservation against commercial logging
(2) Promoting the construction of large dams
(3) Industrialization of hill states
(4) Promoting commercial monoculture plantations
(5) Question not attempted

131. Environmental Impact Assessment (EIA) is best defined as:
(1) Post-project evaluation of damage
(2) Financial audit of an environmental NGO
(3) Evaluating impacts of a proposed project
(4) Legal mechanism to ban new industries
(5) Question not attempted

132. Regarding the Environmental Impact Assessment (EIA) process in India, consider the following statements:
I. It is statutorily backed by the Environment (Protection) Act, 1986.
II. Public consultation is a mandatory component for all categories of projects.
III. Screening is the first step of the EIA process.
Which of the above statement(s) is/are correct?
(1) I and II only
(2) I and III only
(3) II and III only
(4) I, II and III
(5) Question not attempted

133. In the Indian EIA framework, "Category A" projects require environmental clearance from:
(1) State Environment Impact Assessment Authority (SEIAA)
(2) District Magistrate
(3) Ministry of Environment, Forest and Climate Change (MoEFCC)
(4) State Pollution Control Board
(5) Question not attempted

134. Which step of the EIA process determines the terms of reference and the specific environmental issues to be studied?
(1) Screening
(2) Scoping
(3) Public Hearing
(4) Appraisal
(5) Question not attempted

135. What is the role of the Environmental Management Plan (EMP) within an EIA report?
(1) To detail project financial profitability
(2) To outline project marketing strategy
(3) To provide a history of the project site
(4) To propose measures to mitigate impacts
(5) Question not attempted

136. Under the EIA Notification 2006, which projects are exempt from the public consultation process?
(1) Category 'B2' projects
(2) Large hydro-electric projects
(3) Expansion of national highways
(4) Nuclear power plants
(5) Question not attempted

137. Post-environmental clearance monitoring of projects is essential to ensure:
(1) The project completes on schedule
(2) The project generates sufficient revenue
(3) Compliance with environmental conditions
(4) No new employees hired without clearance
(5) Question not attempted

138. Identify the incorrect statement regarding EIA.
(1) Guarantees that no damage will occur
(2) Allows stakeholders to voice concerns
(3) Evaluates alternative project locations
(4) Serves as a decision-making tool
(5) Question not attempted

139. Match List I with List II regarding EIA steps and their objectives:
List I: (EIA Step)
A. Screening
B. Scoping
C. Baseline Study
D. Appraisal
List II: (Objective)
i. Establishes the existing environmental conditions of the site
ii. Determines if a project requires an EIA and at what level
iii. Final review of the EIA report before decision making
iv. Identifies key issues and parameters to be investigated
(1) A-i, B-ii, C-iv, D-iii
(2) A-ii, B-i, C-iv, D-iii
(3) A-iv, B-ii, C-i, D-iii
(4) A-ii, B-iv, C-i, D-iii
(5) Question not attempted

140. Strategic Environmental Assessment (SEA) differs from EIA primarily because SEA is applied to:
(1) Individual and specific physical projects
(2) Policies, plans, and broader programs
(3) Projects occurring in marine environments
(4) Retrospective evaluation of old projects
(5) Question not attempted

141. The National Green Tribunal (NGT) was established in India in the year:
(1) 1986
(2) 2000
(3) 2010

Downloaded from www.pdf.tube

(2) SPCBs are autonomous; CPCB coordinates.
(3) CPCB manages daily SPCB operations.
(4) SPCBs can override national standards.
(5) Question not attempted

161. The Environment (Protection) Act, 1986, was enacted in the wake of which major industrial disaster?
(1) Chernobyl disaster
(2) Bhopal Gas Tragedy
(3) Minamata disaster
(4) Oleum gas leak
(5) Question not attempted

162. The Environment (Protection) Act, 1986 is considered an "umbrella legislation" because:
(1) Framework to coordinate various laws
(2) Deals with protecting forests from rain
(3) Nullifies previous Water and Air Acts
(4) Deals with international treaties only
(5) Question not attempted

163. Under Article 253 of the Indian Constitution, the Parliament enacted the Environment (Protection) Act to implement the decisions of which international conference?
(1) Kyoto Protocol, 1997
(2) Rio Earth Summit, 1992
(3) UN Conference on the Human Environment, Stockholm, 1972
(4) Paris Agreement, 2015
(5) Question not attempted

164. Section 3 of the Environment (Protection) Act, 1986 gives power to the Central Government to:
(1) Arrest individuals without a warrant
(2) Dissolve failing State Governments
(3) Levy income tax on polluting industries
(4) Protect and improve environment quality
(5) Question not attempted

165. Consider the following rules notified under the Environment (Protection) Act, 1986:
I. E-Waste (Management) Rules
II. Bio-Medical Waste Management Rules
III. Coastal Regulation Zone (CRZ) Notification
IV. Environmental Impact Assessment (EIA) Notification
V. Wild Life (Protection) Rules
Which of the above statement(s) is/are correct?
(1) I, II, III and V
(2) I, II, III and IV
(3) II, III, IV and V
(4) I, III, IV and V
(5) Question not attempted

166. Under the Environment (Protection) Act, 1986, the penalty for contravention of its provisions is:
(1) Imprisonment up to 1 year or a fine up to Rs. 10,000
(2) Imprisonment up to 5 years or a fine up to Rs. 1 lakh, or both
(3) Only a monetary fine proportional to the pollution caused
(4) Mandatory closure of the business with no provision for fines
(5) Question not attempted

167. Who has the authority to issue directions for the closure, prohibition or regulation of any industry under Section 5 of the Environment (Protection) Act, 1986?
(1) The Supreme Court only
(2) The National Green Tribunal only
(3) The District Collector
(4) The Central Government
(5) Question not attempted

NODIA

168. Identify the incorrect statement regarding the Environment (Protection) Act, 1986.
(1) It strictly prohibits the establishment of Eco-Sensitive Zones around national parks.
(2) It defines 'environment' to include water, air, land and the inter-relationship with human beings and other living creatures.
(3) It applies to the whole of India.
(4) It allows citizens to file a complaint in a court only after giving a 60-day notice to the government.
(5) Question not attempted

169. Eco-Mark, a certification mark issued by the Bureau of Indian Standards (BIS) for environment-friendly products, operates under the ambit of which legislation?
(1) Bureau of Indian Standards Act, 1986
(2) Consumer Protection Act, 2019
(3) Environment (Protection) Act, 1986
(4) Trade Marks Act, 1999
(5) Question not attempted

152. Regarding the functions of the Central Pollution Control Board (CPCB), consider the following statements:
I. Advise the Central Government on matters concerning the prevention and control of water and air pollution.
II. Coordinate the activities of the State Pollution Control Boards and resolve disputes among them.
III. Provide technical assistance and guidance to the State Boards.
IV. Directly prosecute individual citizens for littering in municipal areas.
Which of the above statement(s) is/are correct?
(1) I, II and III
(2) II, III and IV
(3) I, III and IV
(4) I, II and IV
(5) Question not attempted

153. State Pollution Control Boards (SPCBs) grant "Consent to Establish" and "Consent to Operate" primarily to:
(1) Non-governmental organizations
(2) Agricultural farms
(3) Industries and infrastructure projects
(4) Individual residential households
(5) Question not attempted

154. Under the Air Act of 1981, who is empowered to declare an area as an "Air Pollution Control Area"?
(1) The State Government, after consultation with the State Board
(2) The Prime Minister of India
(3) The Central Pollution Control Board
(4) The Supreme Court of India
(5) Question not attempted

155. Which body is responsible for laying down standards for the quality of air and water at the national level in India?
(1) Indian Council of Medical Research (ICMR)
(2) NITI Aayog
(3) National Environmental Engineering Research Institute (NEERI)
(4) Central Pollution Control Board (CPCB)
(5) Question not attempted

156. The execution of the National Air Quality Monitoring Programme (NAMP) is coordinated by:
(1) Meteorological Department
(2) CPCB
(3) NGT
(4) Ministry of Health
(5) Question not attempted

157. If a factory is operating without the consent of the SPCB and causing severe pollution, what immediate action can the SPCB take?
(1) Sell the factory's assets
(2) Take over factory management
(3) Order closure and utility stoppage
(4) Relocate factory to another state
(5) Question not attempted

158. Match List I with List II regarding environmental board responsibilities:
List I: (Board/Authority)
A. CPCB
B. SPCB
C. MoEFCC
D. NGT
List II: (Key Responsibility)
i. Judicial adjudication of environmental disputes
ii. Formulation of national environmental policies
iii. Setting national ambient air quality standards
iv. Issuing specific consent to operate for local industries
(1) A-ii, B-iii, C-iv, D-i
(2) A-iii, B-iv, C-i, D-ii
(3) A-iv, B-iii, C-ii, D-i
(4) A-iii, B-iv, C-ii, D-i
(5) Question not attempted

159. The financial resources of the State Pollution Control Boards are largely derived from:
(1) Water cess and consent fees
(2) International environmental grants
(3) Donations from environmental NGOs
(4) Percentage of state income tax
(5) Question not attempted

160. Which of the following best describes the relationship between CPCB and SPCBs?
(1) CPCB is entirely subordinate to SPCBs.

Click Here to Buy book on Amazon

(4) 2016
(5) Question not attempted

142. The principal bench of the National Green Tribunal is located in:
(1) Bhopal
(2) Pune
(3) Chennai
(4) New Delhi
(5) Question not attempted

143. NGT is not bound by the procedure laid down under the Code of Civil Procedure, 1908, but is guided by the principles of:
(1) Natural Justice
(2) Strict Liability
(3) Double Jeopardy
(4) Corporate Governance
(5) Question not attempted

144. Given below are two statements, one is labelled as Assertion (A) and the other as Reason (R):
Assertion (A): The NGT has the power to hear cases related to the Wildlife (Protection) Act, 1972.
Reason (R): The NGT was created for effective and expeditious disposal of cases relating to environmental protection.
(1) Both A and R are true and R is the correct explanation of A.
(2) Both A and R are true but R is not the correct explanation of A.
(3) A is true but R is false.
(4) A is false but R is true.
(5) Question not attempted

145. Under the NGT Act, appeals against the decisions of the NGT can be filed before the:
(1) Respective High Court
(2) Supreme Court of India
(3) President of India
(4) Ministry of Environment, Forest and Climate Change
(5) Question not attempted

146. The NGT Act mandates the disposal of applications or appeals finally within how many months of filing?
(1) 3 months
(2) 6 months
(3) 12 months
(4) 24 months
(5) Question not attempted

147. Who is eligible to be appointed as the Chairperson of the National Green Tribunal?
(1) Environmental scientist with experience
(2) Union Minister of Environment
(3) Retired Supreme Court or High Court Judge
(4) Retired civil servant of Cabinet rank
(5) Question not attempted

NODIA

148. Which principle forms the core basis for the NGT ordering compensation and restitution for environmental damage?
(1) Principle of Eminent Domain
(2) The Utilitarian Principle
(3) Principle of Subsidiarity
(4) Polluter Pays and Precautionary Principles
(5) Question not attempted

149. In a landmark order, the NGT banned coal mining in the state of Meghalaya primarily citing:
(1) Violation of current labor laws
(2) Encroachment of international borders
(3) Unscientific mining causing degradation
(4) Tax evasion by mining companies
(5) Question not attempted

150. Which of the following laws does NOT fall under the civil jurisdiction of the NGT?
(1) The Water (Prevention and Control of Pollution) Act, 1974
(2) The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006
(3) The Forest (Conservation) Act, 1980
(4) The Environment (Protection) Act, 1986
(5) Question not attempted

151. The Central Pollution Control Board (CPCB) was constituted under which of the following acts?
(1) Environment (Protection) Act, 1986
(2) Air (Prevention and Control of Pollution) Act, 1981
(3) National Green Tribunal Act, 2010
(4) Water (Prevention and Control of Pollution) Act, 1974
(5) Question not attempted

170. What is the fundamental difference between the Environment Protection Act (EPA) 1986 and the Water/Air Acts?
(1) Grants overarching powers to Center
(2) Is state vs. central legislation
(3) Only deals with hazardous chemicals
(4) Is advisory vs. legally binding
(5) Question not attempted

171. Consider the following ecological zones of Rajasthan:
A. Hadoti Plateau
B. Arid Western Plain
C. Eastern Plains
D. Aravalli Hills
Which of the following represents the correct sequence in descending order of average annual rainfall?
(1) A, D, C, B
(2) A, C, D, B
(3) D, A, C, B
(4) C, A, D, B
(5) Question not attempted

172. The degradation of the Aravalli hills in Rajasthan has primarily resulted in:
(1) Increased annual rainfall in the region
(2) Expansion of the Thar Desert eastwards
(3) Formation of dense tropical rainforests
(4) Recharging of groundwater aquifers
(5) Question not attempted

173. Which mining activity has severely impacted the ecological balance of the Makrana and Rajsamand regions of Rajasthan?
(1) Uranium mining
(2) Coal mining
(3) Marble and stone quarrying
(4) Bauxite mining
(5) Question not attempted

174. The problem of 'fluorosis' in Rajasthan is predominantly caused by:
(1) Excessive mining of zinc
(2) Air pollution from cement factories
(3) Pesticide overuse in cotton farming
(4) High natural fluoride in water
(5) Question not attempted

175. Regarding the impact of unscientific mining in the Aravallis, consider the following statements:
I. It leads to the destruction of wildlife corridors.
II. It increases the groundwater table in the surrounding areas.
III. It generates enormous quantities of silica dust causing silicosis.
Which of the above statement(s) is/are correct?
(1) I and II only
(2) II and III only
(3) I and III only
(4) I, II and III
(5) Question not attempted

176. Which traditional water harvesting system is widely used in the arid regions of Rajasthan to combat water scarcity?
(1) Surangam
(2) Johad
(3) Zing
(4) Ahar Pynes
(5) Question not attempted

177. The Supreme Court of India imposed a blanket ban on mining activities in the Aravalli range in which state(s) to protect its ecology?
(1) Gujarat only
(2) Haryana and Rajasthan
(3) Madhya Pradesh
(4) Punjab
(5) Question not attempted

178. Given below are two statements, one is labelled as Assertion (A) and the other as Reason (R):
Assertion (A): The Indira Gandhi Canal Project has brought green revolution to western Rajasthan but also created environmental issues.
Reason (R): Intensive canal irrigation without proper drainage has led to widespread waterlogging and soil salinity in the command area.
(1) Both A and R are true and R is the correct explanation of A.
(2) Both A and R are true but R is not the correct explanation of A.
(3) A is true but R is false.
(4) A is false but R is true.
(5) Question not attempted

179. The Khejri tree (Prosopis cineraria) holds profound ecological significance in Rajasthan. What is its main environmental benefit?

NODIA

101. The ozone layer is predominantly found in which layer of the Earth's atmosphere?
(1) Troposphere
(2) Mesosphere
(3) Stratosphere
(4) Thermosphere
(5) Question not attempted

102. What is the primary function of the stratospheric ozone layer?
(1) It traps heat to warm the Earth
(2) It absorbs harmful solar UV radiation
(3) It produces oxygen for terrestrial life
(4) It deflects incoming space meteors
(5) Question not attempted

103. Chlorofluorocarbons (CFCs) cause ozone depletion primarily because:
(1) They physically block ozone formation
(2) They form heavy atmospheric precipitate
(3) They increase stratospheric temperature
(4) They release ozone-destroying chlorine
(5) Question not attempted

104. The "ozone hole" refers to a region of exceptionally depleted ozone primarily observed over:
(1) Antarctica
(2) The Equator
(3) The Arctic
(4) The Tropics
(5) Question not attempted

105. Match List I with List II regarding ozone protection agreements:
List I: (International Protocol/Amendment)
A. Vienna Convention
B. Montreal Protocol
C. Kigali Amendment
List II: (Key Focus)
i. Phase-down of Hydrofluorocarbons (HFCs)
ii. Framework for protection of the ozone layer
iii. Phase-out of ozone-depleting substances (ODS)
(1) A-iii, B-ii, C-i
(2) A-i, B-ii, C-iii
(3) A-ii, B-iii, C-i
(4) A-ii, B-i, C-iii
(5) Question not attempted

106. Why was the Kigali Amendment to the Montreal Protocol deemed necessary?
(1) To target HFCs, which are potent GHGs
(2) Because CFCs were not phased out well
(3) To regulate emission from aviation acts
(4) To ban use of all chemical refrigerants
(5) Question not attempted

107. Polar Stratospheric Clouds (PSCs) play a crucial role in ozone depletion over Antarctica by:
(1) Absorbing all incoming UV light
(2) Pushing ozone out of the stratosphere
(3) Heating stratosphere to extreme levels
(4) Providing surfaces for chlorine release
(5) Question not attempted

108. The thickness of the ozone layer is measured in which of the following units?
(1) Micrometers
(2) Dobson Units (DU)
(3) Parts per million (ppm)
(4) Nanometers
(5) Question not attempted

109. Which of the following is an expected health consequence of a significantly depleted ozone layer?
(1) Higher rates of various lung cancers
(2) More frequent outbreaks of malaria
(3) Higher rates of skin cancer and cataracts
(4) Increased prevalence of heart disease
(5) Question not attempted

110. Regarding ozone recovery, consider the following statements:
I. The Montreal Protocol is considered one of the most successful environmental agreements.
II. The Antarctic ozone hole is projected to recover completely by 2030.
III. Hydrochlorofluorocarbons (HCFCs) were introduced as a transitional substitute for CFCs.
IV. The ozone layer over the mid-latitudes has already returned to 1980 levels.
Which of the above statement(s) is/are correct?
(1) I and III only
(2) II and IV only
(3) I, III and IV
(4) I, II, III and IV
(5) Question not attempted

Downloaded from www.pdf.tube

(5) Question not attempted

189. Which unique ecosystem provides a breeding ground for fish, protects coastlines from storm surges, and is classified as a critical wetland?
(1) Alpine meadows
(2) Boreal forests
(3) Mangroves
(4) Chaparral
(5) Question not attempted

190. Eutrophication in wetlands leads to hypoxia, which means:
(1) Excessive weed growth
(2) High concentration of heavy metals
(3) Acidification of water
(4) Depletion of dissolved oxygen
(5) Question not attempted

191. An Urban Heat Island (UHI) refers to a phenomenon where:
(1) Urban areas warmer than rural areas
(2) Urban areas cooler than rural areas
(3) Cities are built on volcanic islands
(4) Solar panels reflecting city heat
(5) Question not attempted

192. Which of the following properties of urban building materials contributes heavily to the UHI effect?
(1) High albedo and low heat capacity
(2) Low albedo and high heat capacity
(3) High permeability to water
(4) Rapid evaporative cooling
(5) Question not attempted

193. The lack of vegetation in urban areas exacerbates the heat island effect primarily due to the reduction of:
(1) Photosynthesis
(2) Evapotranspiration
(3) Albedo
(4) Soil erosion
(5) Question not attempted

194. What is the impact of the "urban canyon effect" generated by tall buildings?
(1) Traps radiation and reduces wind speed
(2) Channels wind to cool streets rapidly
(3) Blocks sunlight to cool city surface
(4) Increases the albedo of the city
(5) Question not attempted

NODIA

195. Consider the following strategies to mitigate the Urban Heat Island effect:
I. Installing green roofs
II. Using cool pavements with high albedo
III. Increasing urban tree canopy
IV. Expanding asphalt surface parking lots
V. Promoting the use of energy-efficient appliances
Which of the above statement(s) is/are correct?
(1) I, II, III and V
(2) II, III, IV and V
(3) I, III, IV and V
(4) I, II, III, IV and V
(5) Question not attempted

196. How does the Urban Heat Island effect impact local environmental pollution?
(1) Decreases formation of ground-level ozone
(2) Helps in rapid dispersal of urban smog
(3) Purifies air by burning particulate matter
(4) Increases cooling energy and emissions
(5) Question not attempted

197. Anthropogenic heat, a contributor to UHI, originates from:
(1) Natural geothermal vents under the city
(2) Absorption of solar radiation by surfaces
(3) Activities such as vehicles and AC use
(4) The absence of cloud cover over cities
(5) Question not attempted

198. Rapid urbanization often leads to the sealing of soil surfaces with impermeable materials. This directly causes:
(1) Enhanced groundwater recharge
(2) Increased flooding and surface runoff
(3) Decreased ambient air temperatures
(4) Improved urban soil fertility
(5) Question not attempted

199. Match List I with List II regarding urban environmental phenomena:
List I: (Urban Phenomenon)
A. High Impermeable Surfaces
B. Dense Traffic
C. Loss of Urban Water Bodies
D. Tall Building Canyons
List II: (Environmental Consequence)
i. Decreased evaporative cooling

harmful substances, including particulate matter of different sizes, nitrogen dioxide, sulfur dioxide, and carbon monoxide, among others. By tracking these key indicators, the index helps inform the public about potential health risks in their area.

47. (1) Pneumoconiosis (Black lung disease)
Workers in certain industries face specific health risks due to the substances they inhale daily. Those employed in underground mining are often exposed to high levels of fine carbon dust. Over many years, this dust accumulates in the lungs, leading to inflammation and scarring. This chronic respiratory condition reduces lung function and is a well-known hazard associated with the extraction of coal.

48. (2) Thermal power plants using coal
A fine, powdery byproduct is produced when pulverized coal is burned to generate electricity. This material is carried away from the combustion chamber by exhaust gases. While it can be captured by filtration systems, its disposal remains a significant environmental challenge. If not managed properly, it can contaminate air, soil, and water near the large facilities that rely on solid fuels.

49. (2) 1981
To address the growing problem of atmospheric contamination, the Indian government established a dedicated legal framework in the early nineteen-eighties. This legislation provides for the prevention, control, and abatement of air pollution. It also empowered specific boards to set standards and regulate emissions from various industrial and domestic sources, marking a significant step in the country's efforts toward environmental protection and management.

50. (1) Electrostatic precipitators
Large industrial facilities use specialized equipment to remove fine particles from exhaust gases before they are released into the atmosphere. One highly effective device uses high-voltage electricity to give the particles a charge, causing them to stick to collection plates. This method allows for the removal of a vast majority of the dust and soot, significantly improving the local air quality.

51. (1) Both A and R are true and R is the correct explanation of A.
When water bodies receive an excess of nutrients, it triggers a rapid increase in the population of microscopic aquatic plants. While these organisms produce oxygen during the day, their eventual death leads to a massive decomposition process by bacteria. This biological breakdown consumes vast amounts of the oxygen dissolved in the water, creating a hostile environment for fish and other aquatic life.

52. (4) Nitrogen and Phosphorus
The process of nutrient enrichment in lakes and slow-moving rivers is primarily driven by two specific elements. These substances are commonly found in fertilizers used in agriculture and in domestic sewage. When they wash into water bodies, they act as powerful fertilizers for algae. The resulting overgrowth disrupts the natural balance of the ecosystem, leading to decreased water clarity and oxygen depletion.

53. (3) Oxygen needed by bacteria for decomposition
Scientists use a specific test to determine the level of organic pollution in a water sample. This measure quantifies the amount of dissolved oxygen required by microorganisms to break down the organic material present over a set period. A high value indicates that the water is heavily contaminated with waste, as more oxygen is needed for the bacteria to complete the decomposition.

54. (2) Methylmercury
A severe neurological condition first discovered in a coastal Japanese town was linked to the industrial discharge of a toxic heavy metal into the local bay. The chemical transformed into an organic form that accumulated in fish and shellfish. People who consumed the contaminated seafood suffered from symptoms like loss of coordination and muscle weakness, illustrating the dangers of mercury in the environment.

55. (4) Secondary treatment to reduce organic matter
During the treatment of wastewater, a biological stage is used to break down dissolved and suspended organic matter. This process involves mixing the water with a concentrated population of bacteria and other microorganisms in an aerated tank. By providing plenty of oxygen, the

Click Here to Buy book on Amazon

ANSWERS

NODIA

1. (2) Interacting organisms and their physical environment
An ecosystem encompasses all living organisms in a given area interacting with their physical, non-living environment like soil, water, and air. This complex system functions as a unit through energy flows and nutrient cycling. Both biotic and abiotic factors are inextricably linked, ensuring the continuous survival and stability of the entire biological community within its surroundings.

2. (1) Decomposers
Abiotic components are the non-living chemical and physical parts of the environment that affect living organisms and the functioning of ecosystems. Examples include temperature, sunlight, and minerals. In contrast, organisms that break down organic matter are biological entities. These life forms belong to the biotic category, playing a vital role in recycling nutrients by consuming dead plants and animals.

3. (3) A zone of transition between diverse ecosystems
An ecotone serves as a boundary or transition area where two different biological communities meet and integrate. This zone often contains species from both adjacent ecosystems and may even support unique organisms not found in either. Because it acts as a bridge between diverse habitats, it usually exhibits high biodiversity and distinct environmental conditions compared to the surrounding major biomes.

4. (4) Nutrient cycling
Functional aspects of an ecosystem describe how the system operates and sustains itself over time. These include processes like productivity, decomposition, and the movement of essential elements through various environmental reservoirs. The circulation of minerals and chemical elements between the biotic and abiotic components ensures that life-sustaining resources remain available for all organisms within the stable biological community.

5. (3) Crop fields are considered natural terrestrial ecosystems.
Ecosystems are categorized based on their origin and habitat. Natural ecosystems, such as forests or estuaries, develop without human interference. However, agricultural lands used for growing food are artificial systems because they are created and managed by humans. These man-made terrestrial environments require constant intervention, such as irrigation and fertilization, to maintain their specific biological structure and productivity.

6. (2) Saprotrophs
Certain organisms specialize in breaking down complex organic remains of dead plants and animals into simpler inorganic molecules. These biological recyclers, often found in soil or water, perform the critical process of decomposition. By releasing enzymes to digest waste externally and then absorbing the nutrients, they return vital minerals to the environment, allowing producers to reuse them for growth.

7. (4) Gross primary productivity
Primary productivity represents the speed at which autotrophs like plants produce biomass through photosynthesis. The total amount of chemical energy or organic matter generated per unit area over a specific period is defined as the gross value. This total production includes the energy that the plants themselves will eventually use for their own respiration and basic metabolic maintenance needs.

8. (1) Both A and R are true and R is the correct explanation of A.
Energy enters an ecosystem primarily through sunlight, which is captured by plants during photosynthesis. This energy then moves through successive trophic levels as organisms consume one another. Since thermodynamic laws dictate that energy is lost as heat at every transfer, it cannot return to the sun. Therefore, the movement of energy remains a one-way path from producers to top consumers.

ii. Increased flash flooding risk
iii. High concentration of NOx and particulate matter
iv. Trapping of heat and reduced wind flow
(1) A-iii, B-ii, C-iv, D-i
(2) A-ii, B-i, C-iii, D-iv
(3) A-i, B-iii, C-ii, D-iv
(4) A-ii, B-iii, C-i, D-iv
(5) Question not attempted

200. Which of the following statements identifies a correct cause and effect relationship associated with Urban Heat Islands?
(1) Cause: Warmer urban nights; Effect: Increased energy demand for air conditioning
(2) Cause: Increased urban greenery; Effect: Higher surface temperatures
(3) Cause: High city albedo; Effect: Increased absorption of solar radiation
(4) Cause: Reduced anthropogenic heat; Effect: Worsening of the UHI effect
(5) Question not attempted

www.nodia.in

Downloaded from www.pdf.tube

these insects form the third level. Finally, larger predators such as reptiles that eat the amphibians sit at the fourth level, completing the energy transfer within the ecosystem.

19. (3) Keystone species
A specific type of organism holds a disproportionately large impact on its environment relative to its abundance. These species are essential for maintaining the diversity and structural integrity of their ecological community. If such a species were removed, the entire ecosystem would undergo drastic changes or even collapse, as many other organisms depend on the specific environmental conditions it helps create.

20. (4) Rapid loss of energy at successive levels
Energy transfer between trophic levels is highly inefficient, with approximately ninety percent of energy lost as heat or used for metabolic processes at each step. By the time energy reaches the fourth or fifth level, the remaining amount is often too small to support a viable population of even higher-level predators. This thermodynamic limitation naturally restricts the length of ecological pathways.

21. (3) Phosphorus cycle
Biogeochemical cycles are classified based on the primary reservoir of the nutrient. Gaseous cycles, like those for nitrogen or carbon, involve the atmosphere as a major storage component. In contrast, sedimentary cycles involve elements that do not have a significant gaseous phase. These minerals are primarily stored in the Earth's crust and move through soil and water over very long periods.

22. (2) The oceans
While carbon is found in the atmosphere and within all living things, the vast majority of the Earth's reachable carbon is stored in the marine environment. The deep waters and sediments of the world's large saline bodies act as a massive sink. Through various chemical and biological processes, these regions regulate the global balance of carbon over long geological timescales.

23. (2) II, III and IV
Carbon dioxide levels in the air are influenced by several natural and human-induced activities. Biological metabolic processes in living organisms and the burning of ancient organic materials release this gas. Additionally, geological events such as eruptions from the Earth's interior contribute to the atmospheric pool. Only the process where plants convert light into chemical energy actually removes carbon dioxide from the air.

24. (1) Nitrobacter
The nitrogen cycle relies on specific groups of specialized microorganisms to transform chemical compounds. During the process of nitrification, ammonia is first converted into nitrites. Following this, a different genus of aerobic bacteria takes over to oxidize those nitrites into nitrates. This final form is highly important because it is the primary way that most terrestrial plants absorb essential nitrogen.

NODIA

25. (3) Nitrogen fixation
Most organisms cannot use the abundant nitrogen gas found in the atmosphere directly. It must first be converted into a more reactive form like ammonia through biological, industrial, or atmospheric processes. This vital step allows the element to enter the food web. Specialized bacteria living in soil or within plant roots are primarily responsible for making this essential nutrient available.

26. (1) Returning nitrogen gas to the atmosphere
In the final stages of the nitrogen cycle, certain anaerobic bacteria transform nitrates back into gaseous nitrogen. This process occurs primarily in waterlogged soils or sediments where oxygen levels are low. By releasing the gas back into the air, these microorganisms maintain the balance of the atmosphere and prevent the excessive accumulation of reactive nitrogen compounds in terrestrial and aquatic environments.

27. (4) Solar radiation
The continuous movement of water on, above, and below the Earth's surface is powered by the sun. Energy from the sun causes liquid water to evaporate from oceans and lakes, turning it into vapor. This same energy also drives atmospheric circulation and weather patterns, which eventually lead to the cooling and falling of water back to the ground as various forms.

9. (3) Pyramid of energy
Ecological pyramids represent different parameters across trophic levels. While those for numbers or biomass can sometimes be inverted depending on the specific habitat, the energy pyramid is always upright. This is because energy is lost as heat at each step, ensuring that the total energy available at higher levels is always significantly less than the level below it.

10. (1) Joseph Grinnell
The term describing the specific role and position of a species within its environment was formally established in the early twentieth century. This concept explores how an organism responds to the distribution of resources and competitors. It encompasses the functional role and physical habitat used by a species, emphasizing that no two different species can occupy the exact same space.

11. (4) Autotrophs
In a typical grazing food sequence, the foundational level consists of self-nourishing organisms. These producers use sunlight to synthesize organic compounds from simple inorganic substances. By capturing solar energy, they provide the primary source of nutrition for all subsequent consumers. Without these green plants or algae at the base, the energy flow through the entire ecosystem would not be possible.

12. (3) I and III only
Food webs are complex networks of interconnected pathways showing how energy travels through an ecosystem. Unlike simple linear chains, webs provide multiple feeding options, which increases the overall stability and resilience of the community. If one food source becomes unavailable, consumers can switch to others. This intricate structure ensures that the biological community can withstand various environmental stresses and fluctuations.

13. (3) 10 Joules
Ecological efficiency dictates that only a small fraction of energy is transferred from one level to the next. When solar energy hits plants, only about one percent is converted into chemical energy. Of that stored energy, only ten percent reaches the herbivores. Applying this rule to a specific amount of solar input results in a significant reduction at the consumer level.

14. (4) Detritus food chain
Ecosystems contain different pathways for energy flow. One specific sequence begins with the consumption of decomposing animal and plant remains. This path involves microorganisms and small scavengers that break down waste materials. By starting with non-living organic matter rather than living plants, this system plays a crucial role in recycling nutrients back into the soil for use by other organisms.

15. (1) Within a single organism over its lifetime
Certain chemicals, particularly those that are fat-soluble and persistent, tend to build up within the body of a living creature over time. This process occurs when an individual absorbs a substance faster than it can be excreted or metabolized. As the organism ages and continues to consume contaminated food or water, the concentration of the toxin increases within its tissues.

16. (2) Inverted
In many marine and freshwater systems, the total mass of the primary producers at any given time is less than the mass of the consumers. This happens because small organisms like phytoplankton have very high turnover rates and are consumed rapidly. Consequently, the graphical representation of biomass across trophic levels appears wider at the top and narrower at the base.

17. (2) DDT and Mercury
Biomagnification is the process where the concentration of persistent pollutants increases as they move up the food chain. Substances like certain heavy metals and synthetic pesticides are not easily broken down or excreted by living organisms. As predators eat large numbers of contaminated prey, these toxins accumulate to dangerous levels in the tissues of apex species, leading to severe health issues.

18. (1) A-iii, B-iv, C-i, D-ii
Grassland food chains follow a structured hierarchy. Green vegetation occupies the first level as the primary producer. Insects that eat the vegetation represent the second level. Smaller predators like amphibians that consume

Click Here to Buy book on Amazon

37. (3) Decibel
Sound intensity is measured using a logarithmic scale that reflects how the human ear perceives different levels of pressure. This unit helps quantify the loudness of sounds, ranging from a quiet whisper to the deafening roar of a jet engine. Identifying these levels is crucial for establishing safety regulations and protecting public health from the adverse effects of excessive acoustic energy.

38. (1) I, II, III and V
Persistent organic pollutants are dangerous chemicals that resist natural degradation and stay in the environment for very long periods. Because they are generally fat-soluble and have low solubility in water, they easily accumulate in the adipose tissues of living creatures. These toxins can travel vast distances through air and water currents, eventually reaching and harming wildlife even in remote polar regions.

39. (4) Discharge of heated water from power plants
Thermal pollution occurs when the temperature of a natural water body is suddenly changed, usually by human activity. The most frequent cause is the use of water as a coolant in large industrial facilities and electricity generating stations. When this heated water is returned to the original source, it decreases dissolved oxygen levels and harms fish and other aquatic organisms.

40. (1) Hypertension
Constant exposure to high levels of sound can lead to various physical and psychological health problems. Beyond hearing loss, chronic loud environments trigger stress responses in the body, which can result in increased blood pressure. This condition significantly raises the risk of heart disease and other cardiovascular issues, highlighting the serious nature of acoustic disturbances as a major environmental health concern.

41. (3) Carbon monoxide
A colorless and odorless gas is produced when fuels containing carbon are burned without enough oxygen. When inhaled, this substance has a much higher affinity for the oxygen-carrying protein in red blood cells than oxygen itself. By forming a stable complex, it prevents the blood from delivering vital oxygen to the body's tissues and organs, which can be fatal at high levels.

42. (1) Sulfur dioxide and Nitrogen oxides
Atmospheric precipitation becomes acidic when certain gases react with water, oxygen, and other chemicals. The primary contributors are compounds released during the combustion of fossil fuels in power plants and vehicles. Once in the air, these substances transform into sulfuric and nitric acids. These acids then fall to the ground as rain, snow, or fog, damaging forests and aquatic ecosystems.

43. (4) It enters the blood via natural defenses
Extremely small airborne particles pose a significant threat to human health due to their ability to bypass the natural filtration systems in the nose and throat. These fine particles can travel deep into the lungs and even pass directly into the bloodstream. Once inside the circulatory system, they can cause widespread inflammation and contribute to various respiratory and cardiovascular diseases over time.

44. (2) Peroxyacetyl nitrate (PAN)
Photochemical smog is a complex mixture of pollutants formed when nitrogen oxides and volatile organic compounds react in the presence of sunlight. This type of haze contains several harmful secondary substances. One particularly toxic compound is known for causing eye irritation and damaging plant tissues. Its presence is a key indicator of the chemical reactions taking place in polluted urban air.

45. (1) I and II only
Air quality inside buildings can be worse than outside due to various factors. Natural sources like radioactive gases seeping from the ground and the use of solid fuels for cooking in poorly ventilated spaces are major concerns. Long-term exposure to these pollutants is a well-documented cause of serious respiratory conditions, including chronic lung diseases that significantly impact the health of vulnerable populations.

46. (2) Eight
To provide a clear and easily understandable measure of air quality, authorities monitor a specific group of major pollutants. This system in India evaluates the concentrations of several

Downloaded from www.pdf.tube

pleasing method is often used to treat large areas of low to moderate soil contamination.

65. (2) Biochar application always increases the toxicity of agricultural soils.
Soil pollution is a complex issue driven by various industrial and agricultural activities. While mining can introduce heavy metals and acid rain can change soil chemistry, not all additives are harmful. For instance, a specific carbon-rich material produced from organic waste is often used to improve soil health. This substance can actually help reduce toxicity by binding with pollutants and enhancing the soil's structure.

66. (2) II, III and IV
Techniques for cleaning contaminated ground are categorized by where the treatment takes place and the methods used. Physical processes like washing and thermal methods that vaporize toxins are common. Treating the soil directly in its original location is generally more economical and less disruptive than removing it for processing elsewhere. These various strategies are essential for restoring polluted land to a safe and productive state.

67. (3) Sodium
The physical structure of soil is heavily influenced by its chemical composition. When a specific alkali metal accumulates in high concentrations, it causes soil particles to disperse, leading to poor drainage and aeration. This condition makes the ground hard and difficult for roots to penetrate, which significantly hinders plant growth. Proper management often involves adding amendments like gypsum to displace the problematic element.

68. (4) DDT
A notorious synthetic chemical once widely used in agriculture and disease control is known for its extreme persistence in the environment. This substance does not break down easily and can remain in the soil for decades. Because it accumulates in the fatty tissues of animals, it has caused significant harm to wildlife populations, leading to widespread bans on its use in many countries.

69. (3) Leachate
When solid waste is disposed of in open areas, it is exposed to rainwater that filters through the pile. This liquid picks up various dissolved and suspended contaminants from the decomposing trash, forming a highly polluted fluid. If not properly collected, this toxic mixture can seep into the underlying soil and eventually reach the groundwater, posing a serious threat to the local environment.

70. (2) Uses earthworms to convert organic waste
Recycling organic waste into a rich soil amendment can be accomplished through a biological process involving specific types of invertebrates. These creatures consume food scraps and other organic materials, breaking them down into a nutrient-dense compost. This method is highly efficient and can be done on both small and large scales, providing a sustainable way to manage waste and improve soil fertility naturally.

71. (2) 5 millimeters
Tiny pieces of plastic that contaminate the environment are defined by their maximum dimension. These particles are typically smaller than half a centimeter. They can originate from the breakdown of larger plastic items or be intentionally manufactured for use in various products. Because of their small size, they are easily ingested by a wide range of organisms, entering the food chain and causing harm.

72. (1) C, A, D, B
Materials vary significantly in how quickly they break down in the environment. Natural minerals used in construction are extremely durable and show almost no biological decay. Common synthetic polymers also persist for centuries. In contrast, some newer plastics made from plant-based sources or produced by bacteria are designed to decompose more rapidly under certain conditions, making them a more sustainable option for specific applications.

73. (3) Manufactured at microscopic sizes for products
Some microscopic plastic particles are intentionally produced for specific commercial uses. These include small beads used in personal care products like exfoliating scrubs or the tiny pellets that serve as raw materials for manufacturing larger items. Unlike pieces that form from the weathering of trash, these are released into the environment in their original,

NODIA

microbes rapidly consume the waste, significantly cleaning the water before it undergoes further filtration or is released into nature.

56. (1) Skeletal fluorosis
While small amounts of a certain mineral can help prevent tooth decay, excessive intake through drinking water over a long period causes serious health problems. The most severe form of this condition affects the bones, leading to pain and permanent deformities. This issue is particularly prevalent in regions where the groundwater naturally contains high concentrations of the mineral due to local geological formations.

57. (3) Nitrate - Methemoglobinemia
Different chemical contaminants in water are linked to specific medical conditions. For example, high levels of a particular nitrogen compound are known to interfere with the blood's ability to carry oxygen, especially in infants. This condition, often caused by runoff from fertilized fields, results in a characteristic bluish tint to the skin and can be life-threatening if the exposure is not stopped.

58. (1) A-iii, B-i, C-iv, D-ii
Cleaning wastewater involves several distinct steps. The initial phase uses physical methods like screening and settling to remove large solids. The next stage employs biological processes where microorganisms digest dissolved organic matter. More advanced techniques are then used to target specific nutrients and chemicals. Finally, the water is treated with chemicals or radiation to kill any remaining harmful bacteria before it is reused.

59. (4) Improve water quality via sewage treatment
A major national initiative was launched to address the severe pollution in one of the world's most significant rivers. The primary objective was to improve the quality of the water by reducing the amount of untreated domestic and industrial waste being discharged. This was achieved through the construction of numerous sewage treatment plants and the diversion of sewage away from the main river.

60. (2) Fecal contamination
Testing for a specific group of microorganisms that are naturally found in the intestines of warm-blooded animals is a standard way to assess water safety. Their presence in a sample serves as a clear warning that the water has been contaminated with waste from humans or animals. This indicator suggests that dangerous pathogens could also be present, making the water unsafe for drinking.

61. (3) Intensive irrigation in arid regions
In dry regions, the buildup of salts in the soil surface is a major environmental concern. This process often occurs when large amounts of water are applied to crops through artificial systems. As the water evaporates or is used by plants, it leaves behind dissolved minerals. Over time, these minerals accumulate to levels that are toxic to most plants, severely reducing the land's productivity.

62. (4) Use of living organisms to degrade contaminants
Cleaning up contaminated environments can be achieved through a technology that uses the natural metabolism of living organisms. These biological agents, such as bacteria or fungi, are introduced to break down or neutralize hazardous substances in the soil or water. This method is often preferred over traditional chemical or physical cleaning because it is more cost-effective and has a lower environmental impact.

63. (1) Excessive use of synthetic pesticides and fertilizers
Modern farming often relies heavily on the application of synthetic chemicals to control pests and boost crop yields. While these products can be effective in the short term, their excessive and improper use leads to the accumulation of toxic residues in the ground. These chemicals can harm beneficial soil organisms, disrupt natural nutrient cycles, and eventually leach into the local groundwater supplies.

64. (2) Plants
An innovative environmental cleanup technique uses the natural abilities of green vegetation to remove, transfer, or stabilize contaminants in the soil. These organisms can absorb heavy metals and other pollutants through their roots and either store them in their tissues or break them down. This cost-effective and aesthetically

Click Here to Buy book on Amazon

28. (2) Phosphorus
Certain biogeochemical cycles involve elements that circulate primarily through the Earth's crust and water bodies without entering the air in any significant amount. Phosphorus is a prime example, as it lacks a stable gaseous form at normal temperatures and pressures. Instead, it moves from rocks to soil and then into living organisms, eventually returning to sediments on the ocean floor.

29. (2) Evaporation → Condensation → Precipitation → Runoff
The movement of water through the environment follows a logical order. First, heat from the sun turns liquid water into vapor. As this vapor rises and cools, it transforms back into tiny liquid droplets. Eventually, these droplets fall to the Earth's surface in various forms. Finally, the excess water flows across the land and returns to larger bodies like the oceans.

30. (4) Transpiration
Living vegetation plays a significant role in the local and global climate by moving water from the soil back into the air. Through small openings in their leaves, plants release moisture that has been absorbed by their roots. This biological process not only helps cool the plant but also contributes significantly to the total amount of humidity in the surrounding atmosphere.

31. (1) Adding substances to environment faster than dispersal
Pollution occurs when various substances or forms of energy are introduced into the environment at a rate faster than they can be naturally neutralized or dispersed. This imbalance leads to undesirable changes in the physical, chemical, or biological characteristics of the air, water, and soil. Such contamination often harms human health and disrupts the delicate functioning of ecosystems across the entire planet.

32. (2) Ground-level Ozone (O3)
Some pollutants are not released directly from a source but are formed in the atmosphere through chemical reactions between other substances. For instance, certain gases can react in the presence of sunlight to create new harmful compounds. Ground-level ozone is a classic example of this, as it arises from complex interactions between nitrogen oxides and volatile organic compounds in the lower atmosphere.

33. (2) Pollution from diffuse and widespread sources
Unlike pollution that comes from a single, identifiable pipe or chimney, some contamination originates from broad and diffuse areas. This type of environmental degradation occurs as water moves over and through the ground, picking up pollutants from varied locations like farm fields or city streets. Because it has no specific point of origin, tracking and controlling this variety is extremely challenging.

34. (1) A-iv, B-i, C-ii, D-iii
Different human activities lead to various forms of environmental degradation. Burning fuels incompletely releases harmful gases into the air. Runoff from agricultural fields carries fertilizers and chemicals into water bodies. Using excessive pesticides directly contaminates the ground. Finally, high-intensity mechanical activities like aviation produce loud sounds that disturb the peace and health of living beings in the vicinity of the source.

35. (3) Smoke and fog
The term used to describe a specific type of intense air pollution was originally created by combining two words. It referred to a thick, dark mixture caused by the combination of coal emissions and natural atmospheric moisture common in industrial cities. While modern versions involve different chemical reactions, the name persists as a general description for visible and harmful atmospheric haze.

36. (4) DDT is a classic example of a biodegradable pollutant.
Pollutants are classified based on how they behave in the environment. Substances that are easily broken down by bacteria and fungi are considered biodegradable. However, certain synthetic chemicals, such as some older pesticides, are extremely resistant to natural decay. These persistent compounds remain in the soil and water for decades, often accumulating in the bodies of animals and causing long-term ecological damage.

NODIA

tiny form, often bypassing traditional wastewater treatment systems and entering oceans.

74. (1) Basel Convention
An international treaty was established to control the transboundary movement of hazardous materials and ensure their environmentally sound management. The agreement has recently been updated to include more specific regulations on the trade of plastic waste. This helps prevent developed nations from shipping their non-recyclable plastic trash to developing countries that may lack the infrastructure to handle it safely, thereby reducing global pollution.

75. (4) Marine debris and plastics
A massive area in the northern Pacific Ocean is known for the high concentration of floating debris brought together by rotating ocean currents. This accumulation consists almost entirely of various types of plastics, ranging from large discarded fishing gear to microscopic fragments. This environmental disaster poses a serious threat to marine life through ingestion and entanglement, highlighting the scale of the global plastic crisis.

76. (2) Animals mistake plastics for food items
Plastic pollution is particularly dangerous to ocean animals because they often cannot distinguish between floating trash and their natural prey. When creatures consume these synthetic materials, it can cause internal injuries, block their digestive systems, and lead to starvation. Additionally, the chemicals within the plastic can leach into the animals' tissues, causing long-term health problems and disrupting reproductive success across many different species.

77. (3) Items used once before disposal
Many modern convenience items are designed to be used only once before they are thrown away or recycled. These products, such as straws, bags, and food packaging, are typically made from durable synthetic polymers that do not decompose in the environment. Because they are used for such a short time but last for centuries, they contribute disproportionately to the growing global waste problem.

78. (2) 1st July 2022
To combat the rising tide of environmental pollution, the Indian government implemented a significant nationwide ban on the production and use of numerous disposable plastic items. This regulation took effect in the middle of twenty twenty-two. By targeting products with high littering potential and low utility, the policy aims to reduce the environmental footprint of non-biodegradable waste and encourage more sustainable alternatives.

79. (1) I, II, IV and V
A policy approach to waste management requires those who produce or import products to be responsible for their entire lifecycle, including disposal and recycling. This system shifts the financial and logistical burden from the public sector to the manufacturers. By holding companies accountable, it encourages the design of more eco-friendly packaging and promotes higher recycling rates, ultimately reducing the volume of waste.

80. (2) Plastic pellets used in manufacturing
Tiny, pre-production plastic pellets are the fundamental building blocks for nearly all plastic goods. During shipping and manufacturing, these small granules are often spilled, eventually finding their way into rivers and oceans. Because they are small and buoyant, they wash up on beaches worldwide. These pellets are easily mistaken for food by birds and fish, making them a significant source of marine pollution.

81. (2) The Earth Summit in Rio de Janeiro, 1992
A critical international treaty aimed at stabilizing greenhouse gas concentrations was established during a landmark global gathering in Brazil. This conference, held in nineteen ninety-two, brought together world leaders to discuss sustainable development and environmental protection. The resulting framework laid the foundation for future climate negotiations and agreements, emphasizing the need for global cooperation to address the growing threat of human-induced climate change.

82. (1) A-iii, B-ii, C-iv, D-i
Addressing global warming involves several different strategies. Reducing the sources of heat-trapping gases is a proactive approach to limit

Downloaded from www.pdf.tube

feedback before they are approved. Smaller projects that are considered to have less significant or more localized environmental impacts are often placed in a specific sub-category. For these activities, the approval process is streamlined to allow them to proceed more quickly, while still ensuring that basic environmental standards are met by the project proponents.

137. (3) Compliance with environmental conditions
After a project has been given the green light to proceed, it is essential to keep a close eye on its operations over the long term. This ongoing oversight is necessary to confirm that the developers are following all the environmental rules and requirements set during the approval phase. By tracking the project's performance, authorities can ensure that any unforeseen impacts are addressed and that the surrounding environment remains protected.

138. (1) Guarantees that no damage will occur
While assessing potential impacts is a powerful way to manage environmental risks, it cannot provide a total assurance that no harm will ever occur. Instead, the process serves as a framework for identifying likely problems and exploring alternatives. It allows for public participation and provides decision-makers with the information they need to balance economic goals with the long-term health of the environment and the well-being of local communities.

139. (4) A-ii, B-iv, C-i, D-iii
The process of evaluating environmental impacts involves several logical steps. First, it is determined if a project needs an assessment at all. Then, the most important issues to be studied are identified. Next, information is gathered about the existing state of the environment. Finally, all the collected information is reviewed by experts to make a recommendation on whether the project should be allowed to go ahead under specific conditions.

140. (2) Policies, plans, and broader programs
While traditional assessments focus on individual projects, a more comprehensive approach is used for broader initiatives. This type of evaluation is applied to government policies, regional plans, and large-scale programs before they are even translated into specific projects. By considering the environmental implications at this higher level of decision-making, it is possible to integrate sustainability into the very foundation of development and avoid the cumulative impacts of multiple activities.

141. (3) 2010
To provide a dedicated forum for the resolution of environmental disputes, a specialized judicial body was created in India. This organization was established through a specific act of parliament in the year twenty-ten. Its creation marked a significant milestone in the country's legal history, as it allows for the expert and efficient handling of cases related to environmental protection, conservation of forests, and the enforcement of any legal rights related to the environment.

142. (4) New Delhi
The specialized tribunal for environmental cases operates through several locations across India to ensure accessibility. However, its main headquarters and most important administrative center are located in the national capital. This central bench oversees the operations of the entire organization and handles some of the most complex and significant cases. Additional regional offices are located in other major cities to handle matters within their respective areas of jurisdiction and geographic zones.

143. (1) Natural Justice
The environmental tribunal has more flexibility than traditional civil courts and is not restricted by some of the standard legal procedures. Instead, its decisions are informed by the fundamental principles of fairness and the right to be heard. This approach allows the body to focus on the technical and scientific aspects of environmental cases while ensuring that all parties are treated equitably and that justice is served in a timely and effective manner.

144. (4) A is false but R is true.
A specialized environmental court was created to provide a dedicated space for resolving disputes related to the protection of nature. While it has broad authority over many national environmental laws, its jurisdiction does not include all of them. Specifically, cases involving the protection of wild animals and birds are handled by separate legal systems. This distinction

NODIA

resulting heat from escaping back into space. This natural process is essential for keeping the planet warm enough to support life. However, human activities are increasing the concentration of these gases, leading to an enhanced warming effect globally.

92. (2) Sulfur hexafluoride
Different gases vary in their ability to trap heat and their lifespan in the atmosphere. One specific industrial gas is known for being extremely effective at absorbing radiation, making it thousands of times more potent than carbon dioxide on a molecule-for-molecule basis. Because it is very stable and stays in the air for thousands of years, even small amounts contribute significantly to long-term warming.

93. (1) B, C, A
Several different substances contribute to the natural warming of the planet. The most significant contributor by far is the gas that forms clouds and humidity. This is followed by a gas released through both natural and human activities like burning fuels. Other potent gases exist in much smaller concentrations but still play a role in the complex interactions that maintain the Earth's temperature.

94. (4) Long-term heating of climate system
The long-term increase in the Earth's average surface temperature is driven primarily by human activities that release heat-trapping gases. Unlike seasonal weather changes or localized heating in cities, this phenomenon affects the entire planet over decades and centuries. It results in widespread changes to weather patterns, rising sea levels, and significant disruptions to ecosystems and human societies across all continents and oceans.

95. (1) Albedo decreases, increasing absorption
The reflectivity of the Earth's surface plays a critical role in the global climate. Bright surfaces like ice reflect most of the incoming sunlight back into space. When this ice melts and is replaced by dark ocean water, the amount of energy absorbed by the planet increases. This feedback loop accelerates the warming process, leading to even more ice loss and higher temperatures.

96. (2) Methane is exclusively produced by industrial activities.
While human activities are major sources of various greenhouse gases, many also occur naturally. For example, a potent heat-trapping gas is produced not only by industrial processes but also through biological decomposition in wetlands and the digestive systems of certain animals. Understanding both the natural and anthropogenic sources of these gases is essential for developing effective strategies to manage their atmospheric concentrations.

97. (2) Methane
In the cold regions of the north, the ground remains frozen throughout the year, trapping large amounts of ancient organic matter. As temperatures rise and this frozen layer thaws, microbes begin to break down the material. This biological process releases a powerful greenhouse gas into the atmosphere. This release is a major concern because it can trigger further warming and even more rapid melting.

98. (1) Via thermal expansion and ice melting
Rising global temperatures cause sea levels to increase through two primary physical processes. First, the heat causes glaciers and polar ice sheets to melt, adding more liquid water to the oceans. Second, as the ocean water itself warms up, it physically expands and takes up more space. Together, these factors lead to a steady rise in the average height of the world's seas.

99. (1) Both A and R are true and R is the correct explanation of A.
While some gases are more potent at trapping heat than others, their total impact depends on their concentration and how long they remain in the air. Carbon dioxide is released in massive quantities from burning fossil fuels and stays in the atmosphere for centuries. Therefore, even though a molecule of methane is more effective at absorbing radiation, the sheer volume of carbon dioxide makes it the primary driver.

100. (4) Photosynthesis
Natural systems have ways of removing carbon dioxide from the air, which helps regulate the global climate. The most important of these biological processes occurs in green plants and algae. By using sunlight to convert the gas into

Click Here to Buy book on Amazon

organic compounds, these organisms effectively store carbon in their tissues and the soil. This function makes forests and oceans critical components in the Earth's carbon balance.

101. (3) Stratosphere
The Earth's atmosphere is divided into several distinct layers based on temperature and composition. A specific region containing a high concentration of a three-atom oxygen molecule is located above the lowest layer where weather occurs. This protective shield sits between approximately fifteen and thirty-five kilometers above the surface. Its presence is vital for life because it filters out most of the sun's harmful ultraviolet radiation.

102. (2) It absorbs harmful solar UV radiation
High in the atmosphere, a thin layer of gas performs a critical role in protecting all living things on Earth. It acts as a natural filter, absorbing the majority of the high-energy ultraviolet radiation from the sun. Without this shield, this radiation would reach the surface in amounts that could cause widespread damage to DNA, increase skin cancer rates, and harm many different types of ecosystems.

103. (4) They release ozone-destroying chlorine
Certain synthetic chemicals were once commonly used in cooling systems and aerosol cans. When these stable compounds reach the upper atmosphere, they are broken down by intense sunlight. This reaction releases a highly reactive element that can destroy thousands of ozone molecules through a series of chemical cycles. This process leads to a significant thinning of the protective layer that filters ultraviolet radiation.

104. (1) Antarctica
Every year, a dramatic thinning of the ozone layer occurs over a specific polar region during the late winter and spring. This phenomenon is driven by unique atmospheric conditions and the presence of man-made chemicals. The extreme cold in the area leads to the formation of special clouds that provide a surface for the chemical reactions that destroy ozone molecules, resulting in the well-known depletion zone.

105. (3) A-ii, B-iii, C-i
International efforts to protect the atmosphere have evolved through several key agreements. The initial framework established a commitment to cooperation and research. This was followed by a binding treaty to phase out the production of substances that directly destroy ozone molecules. More recently, an amendment was added to target other chemicals that, while safe for ozone, contribute significantly to the global warming problem.

106. (1) To target HFCs, which are potent GHGs
While the original agreement successfully addressed chemicals that were destroying the ozone layer, their replacements turned out to be extremely potent greenhouse gases. To prevent these substitutes from contributing to rapid global warming, an international amendment was adopted. This new regulation requires a gradual reduction in the use of these heat-trapping substances, helping to protect both the ozone layer and the global climate system.

107. (4) Providing surfaces for chlorine release
During the dark polar winter, the temperature in the upper atmosphere can drop low enough for clouds to form in a region that is usually very dry. These clouds provide a solid surface where chemical reactions occur between stable reservoir molecules. When the sun returns in the spring, these reactions release highly reactive forms of chlorine, which then rapidly destroy ozone in a catastrophic cycle.

NODIA

108. (2) Dobson Units (DU)
Scientists use a specific unit to represent the total amount of ozone in a vertical column of air above a given location. It is defined as the thickness that the ozone would have if it were compressed into a pure layer at standard temperature and pressure. This measure allows for easy comparison of ozone levels across the globe and helps track the recovery of the protective layer.

109. (3) Higher rates of skin cancer and cataracts
A significant decrease in the concentration of ozone in the upper atmosphere allows more high-energy radiation to reach the Earth's surface. This increased exposure is directly linked to several serious human health issues. Most notably, it leads to higher incidences of DNA damage in

skin cells and clouding of the lens in the eye. These conditions can result in chronic illness and loss of vision over time.

110. (1) I and III only
The international treaty governing ozone-depleting substances is widely regarded as a major success in environmental policy. As a result of global cooperation, the concentration of harmful chemicals in the air is slowly declining. While some areas are showing signs of recovery, the process is slow, and it will take several more decades for the ozone layer over the most affected regions to return to its original state.

111. (1) Arid, semi-arid, and dry sub-humid areas
Land degradation in specific climate zones is a major global environmental challenge. This process occurs in regions where the amount of water lost through evaporation and plant usage exceeds the amount of rainfall received. These dry areas are particularly vulnerable to over-exploitation and shifting weather patterns. When the soil in these zones loses its productivity and biological potential, it is formally described as a type of desertification.

112. (2) Overgrazing by livestock
Several human activities contribute to the loss of productive land in dry regions. The most significant factor worldwide is the pressure placed on vegetation by large numbers of domestic animals. When livestock eat more plants than can naturally regrow, the soil is left exposed to wind and water erosion. This disruption of the natural plant cover is the primary driver of the degradation seen in many arid lands.

113. (2) The Sahel region, Africa
An ambitious project aims to restore millions of hectares of degraded land by planting a massive belt of trees and vegetation across a wide geographical area. This initiative is focused on a transition zone south of a major desert, where environmental conditions are increasingly harsh. By creating a living barrier, the project helps to improve soil health, provide local resources, and combat the southward expansion of drylands.

114. (1) Soil salinization
In arid environments, using too much water for farming can have unintended negative effects on the soil. When water is added to the ground, it can cause the water table to rise, bringing dissolved minerals to the surface. As the water eventually evaporates in the heat, these minerals are left behind. The resulting accumulation of salt makes the ground toxic to most crops, accelerating the degradation process.

115. (3) UNCCD
A specific international agreement was established to address the problem of land degradation and the impacts of drought, particularly in vulnerable regions. This treaty provides a framework for cooperation and action to restore productive soil and manage land sustainably. It emphasizes the importance of community involvement and scientific knowledge in creating long-term solutions for people living in the world's most affected dryland areas.

116. (4) A-ii, B-iii, C-iv, D-i
Several techniques are used to prevent and reverse the degradation of drylands. Planting rows of trees helps to slow down the wind and protect the soil from being blown away. On hillsides, building steps prevents water from washing away the topsoil. Using different crops in a sequence helps maintain nutrients, while specific methods are used to stop the movement of loose sand and stabilize the ground.

117. (3) It releases stored carbon from soil
The loss of vegetation and soil health in dry regions has significant implications for the global atmosphere. Healthy soil and plants act as reservoirs for carbon, keeping it out of the air. When land becomes degraded, this stored carbon is released, primarily as a heat-trapping gas. This contribution to the greenhouse effect helps drive global warming, which can then create even more severe droughts in a dangerous cycle.

118. (2) Rajasthan
Large areas of land in India are facing the threat of degradation due to both natural factors and human activities. The impact is most severe in a northern state that contains a vast arid region. Because of its climate and the high demand for limited resources, more than half of the land in this state is considered to be affected by the processes that lead to the loss of productivity.

NODIA

153. (3) Industries and infrastructure projects
Regional boards have the power to regulate any activity that could potentially release pollutants into the air or water. Before a major facility can be built or start operating, the owners must obtain formal permission from these authorities. This process applies to a wide variety of activities, including large factories, power plants, and significant building projects. By granting or withholding this consent, the boards can ensure that these developments include necessary pollution control measures.

154. (1) The State Government, after consultation with the State Board
Under the national law for protecting air quality, specific regions can be identified for more rigorous regulation if they are facing significant contamination. The power to make this designation lies with the regional administration, following a formal discussion with the specialized pollution control board. This allow authorities to focus their efforts and resources on the most affected areas, implementing stricter controls on industrial and domestic emissions to improve the public health.

155. (4) Central Pollution Control Board (CPCB)
Determining the maximum acceptable levels of pollutants in the environment is a critical task for protecting public health and nature. In India, this responsibility lies with a central scientific body that sets national standards for the quality of air and water. These benchmarks provide a clear target for regional authorities and help to ensure that environmental protection efforts are consistent across the entire country, regardless of local variations in industrial activity.

156. (2) CPCB
To get a clear picture of air quality across the whole nation, a comprehensive monitoring program is in place. This initiative is managed by the central pollution control authority, which works with regional boards to collect and analyze data from hundreds of stations in different cities. By providing regular and accurate information, this program helps scientists and policymakers understand the scale of the problem and develop effective strategies for protecting people's health.

157. (3) Order closure and utility stoppage
When a facility is found to be causing serious harm to the environment or operating without the required permissions, regional authorities have the power to take swift and decisive action. They can issue an order to stop the facility's operations immediately. To make this effective, they can also direct other agencies to cut off essential services like electricity and water. These strong measures are necessary to prevent further pollution and ensure compliance.

158. (4) A-iii, B-iv, C-ii, D-i
Different organizations in the environmental management system have unique roles. The central authority sets national standards for quality, while regional boards handle the direct regulation of local businesses. At the highest level, the government department develops broad policies and international strategies. Finally, a specialized court is used to resolve legal disputes and provide justice for environmental damage. This multi-layered approach ensures that environmental protection is addressed from many different perspectives.

159. (1) Water cess and consent fees
To fund their operations and monitoring programs, regional pollution control boards rely on several sources of income. A significant portion of their budget comes from the fees they collect from industries for the permission to operate. Additionally, they receive a share of the charges levied on the use of water by various facilities. These funds allow the boards to remain financially independent and effectively carry out their duties to protect the air and water.

160. (2) SPCBs are autonomous; CPCB coordinates.
The system for managing pollution in India is built on a partnership between a central authority and several regional boards. While the regional bodies have a high degree of independence in their daily operations and decisions, the central body plays a vital role in providing a unified national framework. It ensures that different regions are working toward the same goals, provides technical support, and helps to resolve any conflicts between the different state authorities.

Downloaded from www.pdf.tube

128. (2) Tropical timber and valuable hardwoods
The unauthorized cutting and removal of trees is often fueled by the high value placed on certain types of wood in the global market. These precious materials are highly sought after for making high-quality furniture, flooring, and other luxury goods. Because of the large profits involved, criminal groups often bypass environmental laws and exploit protected forest areas, leading to rapid habitat destruction and the loss of biodiversity.

129. (2) By increasing human and wildlife contact
The destruction of natural habitats brings people into closer proximity with wild animals that they would otherwise rarely encounter. As forests are cleared for farming or development, the boundaries between human communities and wildlife become blurred. This increased contact provides more opportunities for pathogens to jump from animals to humans. Such events can lead to the outbreak of new infectious diseases that can spread rapidly through the global population.

130. (1) Forest conservation against commercial logging
A historic grassroots movement in northern India focused on protecting trees from being cut down by commercial interests. The participants, mostly women from local villages, used non-violent methods such as hugging the trunks to prevent loggers from using their saws. This action highlighted the importance of forests for the livelihoods of mountain communities and became a powerful symbol for environmental conservation and social justice around the world.

131. (3) Evaluating impacts of a proposed project
Before a major project begins, a formal process is used to predict and evaluate the potential consequences for the surrounding environment. This study considers the likely impacts on air, water, soil, and the health of local communities. By identifying these issues early, developers can find ways to reduce or prevent harm. This assessment is a critical tool for ensuring that new developments are sustainable and socially responsible.

132. (2) I and III only
The legal framework for assessing the environmental effects of projects in India is based on a major national protection law. The process involves several mandatory stages, beginning with a decision on whether a full study is even required. While many projects involve gathering feedback from the public, some specific types are excused from this step. These assessments are essential for balancing the needs of development with environmental conservation.

133. (3) Ministry of Environment, Forest and Climate Change (MoEFCC)
Projects that have the potential for significant environmental impact are classified into a specific group that requires a high level of scrutiny. For these developments, the final decision on whether they can proceed is made at the national level by the central government's environmental authority. This ensures that large-scale industrial and infrastructure activities are evaluated according to rigorous standards that protect the interests of the entire country and its natural resources.

NODIA

134. (2) Scoping
After it is decided that an environmental study is necessary, a specific phase is used to define the boundaries and focus of the investigation. During this stage, experts identify the most important issues that need to be addressed and determine the methods that will be used to collect data. This ensures that the final report will cover all relevant concerns and provide a solid basis for making an informed decision.

135. (4) To propose measures to mitigate impacts
A critical part of an environmental report is a detailed plan that outlines the specific actions that will be taken to manage the project's impact. This document describes the measures for preventing, reducing, and compensating for any negative effects identified during the assessment. It also includes details on how these actions will be monitored over time to ensure that the project remains in compliance with environmental standards and goals.

136. (1) Category 'B2' projects
Not all development activities are required to undergo a formal process of gathering public

119. (4) It refers primarily to the expansion of existing deserts into non-desert areas.
Desertification is a complex process of land degradation driven by climate change and human actions. It leads to the loss of plant life and a decrease in the land's ability to produce food. However, it is important to understand that this phenomenon is not simply about the movement of existing deserts. Instead, it involves the gradual decline of productivity in various dryland areas that were previously fertile.

120. (1) Maintaining healthy land resources
A key global goal is to ensure that the total amount and quality of healthy land resources remain stable or increase over time. This concept focuses on balancing any new degradation with the restoration of land that has already been damaged. By maintaining the natural potential of the soil, societies can ensure food security and protect the essential services that ecosystems provide to all living beings on the planet.

121. (2) I, II, IV and V
The large-scale removal of trees has profound effects on the environment at both local and global scales. It disrupts weather patterns, increases the risk of floods, and is a primary reason for the extinction of many species. Furthermore, instead of lowering the amount of carbon dioxide in the air, the loss of forests actually increases it, as the stored carbon is released during the clearing process.

122. (1) Jhum cultivation
A traditional farming method involves clearing a patch of forest by cutting down trees and burning the remaining vegetation to fertilize the soil. After a few years of growing crops, the land is left to recover while the farmers move to a new area. While this practice worked when populations were small, it now contributes significantly to the permanent loss of forests and biodiversity in many regions.

123. (4) Reducing emissions from deforestation
An international mechanism was created to encourage developing nations to protect their forests as a way to combat global warming. This program provides financial incentives for countries to reduce the rates of tree clearing and degradation. By valuing the carbon stored in standing forests, the initiative aims to make conservation more economically attractive than activities that lead to the permanent loss of essential woodland ecosystems.

124. (2) Reducing precipitation via evapotranspiration
Forests play a vital role in moving water from the ground back into the air through their leaves. When trees are removed, this natural process is significantly reduced, leading to drier local conditions and a decrease in rainfall. Furthermore, the absence of a tree canopy and root systems means that less water is absorbed by the soil, which increases the speed of runoff and the frequency of floods.

125. (3) Planting trees where none existed recently
Establishing a new forest in an area where trees have not grown for a long period is a key strategy for environmental restoration. This human activity involves planting a variety of species on land that was previously used for other purposes, such as agriculture or mining. By creating these new woodland areas, it is possible to increase carbon storage, protect the soil from erosion, and provide new habitats for wildlife.

126. (4) The Bonn Challenge
A global effort was launched to restore hundreds of millions of hectares of degraded and deforested land within a specific timeframe. This initiative brings together governments, private organizations, and local communities to implement restoration projects that benefit both the environment and people. By focusing on the recovery of ecological functions, the program aims to improve biodiversity, enhance food security, and help countries meet their international climate commitments.

127. (1) $1 \rightarrow 2 \rightarrow 3$
When trees are cleared from a large area, the environmental consequences follow a predictable chain of events. Without the protection of the canopy and the binding power of the roots, the soil is quickly washed or blown away. This loss of the nutrient-rich upper layer of the ground makes it much harder to grow crops. Consequently, the ability of the land to support agriculture declines, impacting the local economy.

Click Here to Buy book on Amazon

ensures that different aspects of conservation are managed through the most appropriate and specialized judicial frameworks available.

145. (2) Supreme Court of India
When a party is dissatisfied with a final decision made by the environmental tribunal, there is a specific legal path for seeking a further review. Because of the high status and expertise of the tribunal, its orders cannot be challenged in lower or intermediate courts. Instead, any appeal must be filed directly with the highest judicial authority in the country. This ensures that significant environmental matters are given the ultimate level of legal consideration.

146. (2) 6 months
One of the main reasons for creating a specialized environmental court was to ensure that cases are resolved much more quickly than in the traditional legal system. The law that established the tribunal includes a clear requirement for all applications and appeals to be finalized within a specific period. This six-month goal helps to prevent long delays, which are particularly harmful in environmental matters where damage can be irreversible if not addressed promptly.

147. (3) Retired Supreme Court or High Court Judge
The leadership of the specialized environmental tribunal requires a high level of legal expertise and experience. To ensure this, the person chosen for the top position must have previously served at one of the highest levels of the national or state judiciary. This requirement guarantees that the chairperson has a deep understanding of the law and the judicial process, which is essential for managing a body that makes significant decisions about environmental protection and justice.

148. (4) Polluter Pays and Precautionary Principles
When making decisions about environmental damage, the tribunal follows established global legal concepts. These ideas ensure that those who cause pollution are held financially responsible for the cleanup and restoration. Additionally, the court takes a cautious approach to development, requiring that activities be restricted if there is a potential for significant harm, even if some scientific uncertainty exists. These core ideas are fundamental to the modern legal framework for protecting the environment and public health.

149. (3) Unscientific mining causing degradation
In a significant ruling, the environmental tribunal stopped the extraction of a certain fossil fuel in a northeastern state. The court found that the methods being used were highly dangerous and were causing severe pollution to the local water and soil. Because the mining was being done without following proper safety and environmental standards, it posed a threat to the health of workers and the long-term stability of the region's delicate mountain ecosystems.

150. (2) The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006
The environmental tribunal has authority to handle cases involving a wide range of national laws related to air, water, and forests. However, some pieces of legislation that deal primarily with social issues or rights of specific groups are outside its scope. For example, laws that recognize traditional land and resource rights of indigenous communities are managed through different channels, as they involve complex historical and social considerations.

151. (4) Water (Prevention and Control of Pollution) Act, 1974
To address the growing problem of contamination in the country's rivers and lakes, the government created a central authority in the mid-seventies. This body was established under a specific piece of legislation focused on the prevention and control of water pollution. Since its creation, its role has expanded to include many other aspects of environmental management, but its legal foundation remains rooted in this original effort to protect precious water resources.

152. (1) I, II and III
The central authority for pollution control has several important responsibilities at the national level. It provides technical advice to the government, coordinates the work of various regional boards, and offers guidance on best practices for environmental protection. While it plays a critical role in setting standards and managing programs, it does not typically handle the direct prosecution of individuals for minor local offenses, which is usually managed by local agencies.

NODIA

future changes. At the same time, societies must adjust to the impacts that are already occurring. Support for these actions often requires significant financial resources from various levels of government. Additionally, natural and artificial processes that remove carbon from the air are essential.

83. (1) Below 2 degrees, ideally 1.5 degrees
A major international accord aims to significantly reduce global greenhouse gas emissions to limit the increase in the Earth's average temperature. The primary target is to keep the warming well below a specific threshold compared to levels before the industrial era. Efforts are also being made to further restrict the increase to a more ambitious level to avoid the most catastrophic impacts.

84. (4) Paris Agreement
Under a significant global climate treaty, each participating country must outline and communicate its individual efforts to reduce national emissions and adapt to the impacts of a changing climate. These voluntary commitments are updated regularly to reflect increasing ambition. This approach allows for a flexible yet coordinated global response, with each nation contributing according to its own capabilities and circumstances.

85. (3) Building sea walls to protect coasts
While many actions focus on reducing the causes of climate change, others are designed to help communities cope with the inevitable effects. For example, building infrastructure to protect coastal areas from rising sea levels is a practical way to manage risk. Unlike shifting to renewable energy or planting trees, these physical interventions directly address the consequences of a warmer world and shifting weather patterns.

86. (2) UNEP and WMO
A leading international body for the assessment of climate change was created through the collaboration of two major global organizations. One focused on environmental issues and the other on weather and climate patterns. Their goal was to provide policymakers with regular scientific assessments regarding the physical basis of climate change, its potential impacts, and various options for mitigation and adaptation strategies worldwide.

87. (2) I and III only
A warming planet leads to numerous significant alterations in the Earth's systems. These include changes in where different climates are found and how much rain falls in various regions. Furthermore, the intensity and frequency of severe weather events like powerful storms and prolonged dry spells are increasing. However, instead of falling, the levels of the world's oceans are actually rising due to melting ice.

88. (1) Balancing emissions with gas removal
Achieving a balance between the amount of greenhouse gases produced and the amount removed from the atmosphere is a critical environmental goal. This state does not mean all emissions must stop completely, but rather that any remaining releases are offset by natural or technological processes that capture and store the gases. This approach is seen as essential for stabilizing the global climate system.

89. (3) Absorption of carbon dioxide by oceans
As human activities increase the amount of carbon dioxide in the atmosphere, a significant portion of this gas is absorbed by the world's oceans. When this gas dissolves in seawater, it undergoes a chemical reaction that increases the water's acidity. This change makes it difficult for many marine organisms, such as corals and shellfish, to build their shells and skeletal structures.

90. (1) Achieve the target of Net Zero by 2050
During a major climate summit, India announced a set of five ambitious targets to address global warming. These goals include significantly increasing renewable energy capacity and reducing total carbon emissions by the end of the decade. While the nation has committed to achieving a balance between emissions and removals, the specific target year for this milestone is set later than for many other countries.

91. (4) Trapping of heat by atmospheric gases
Certain gases in the Earth's atmosphere act like the glass in a garden structure, allowing sunlight to pass through but preventing some of the

Downloaded from www.pdf.tube

161. (2) Bhopal Gas Tragedy
A major national law for protecting the environment was passed following one of the worst industrial accidents in history. This tragic event, which occurred in a central Indian city, involved the release of a highly toxic gas from a chemical plant, causing thousands of deaths and long-term health problems. The disaster highlighted the urgent need for a stronger and more comprehensive legal framework to manage hazardous substances and protect the public and environment.

162. (1) Framework to coordinate various laws
The national environmental law enacted in the mid-eighties is often described using a term that reflects its broad and comprehensive nature. It provides a central framework that allows for the coordination of various other more specific laws related to air and water pollution. By giving the government wide-ranging powers to address any environmental issue, it ensures that there are no gaps in the legal system and that protection is covered under one authority.

163. (3) UN Conference on the Human Environment, Stockholm, 1972
The power to create national environmental laws in India is derived from the constitution, which allows the government to implement international agreements. The specific law passed in nineteen eighty-six was designed to meet the commitments made during the first major global meeting on the human environment held in Sweden. This landmark conference emphasized that the protection of the Earth is a shared responsibility of all nations and that governments must actively manage natural resources.

164. (4) Protect and improve environment quality
A key part of the national environmental law gives the central government broad authority to take any actions it deems necessary to protect the quality of the air, water, and soil. This includes the power to set standards for pollutants, regulate the location of industries, and manage the handling of hazardous materials. By having this central authority, the country can ensure a consistent and effective response to any environmental challenges across its different regions.

165. (2) I, II, III and IV
Many specific regulations have been established under the authority of the overarching national environmental law to address different types of waste and sensitive areas. These include rules for managing electronic and medical waste, as well as notifications for protecting coastal regions and evaluating the impacts of new projects. While many aspects are covered, some specific laws for protecting wildlife and their habitats are managed through a separate and older legal framework.

166. (2) Imprisonment up to 5 years or a fine up to Rs. 1 lakh, or both
To ensure that environmental laws are taken seriously, the national legislation includes significant punishments for those who break the rules. Depending on the severity of the offense, individuals or companies can face substantial fines or even spend several years in prison. In some cases, both types of penalties can be applied. These strong deterrents are essential for encouraging people and businesses to follow the regulations and for protecting the environment and public health.

167. (4) The Central Government
The national environmental law gives a specific branch of the government the power to issue direct orders to any industry or facility. This includes the authority to shut down operations, stop the supply of utilities, or require changes to how a business is managed if it is found to be causing harm to the environment. This central power ensures that there is a swift and effective way to address serious pollution problems and protect communities.

NODIA

168. (1) It strictly prohibits the establishment of Eco-Sensitive Zones around national parks.
The national environmental law is a powerful tool for protecting nature and public health across the entire country. It defines the environment in a broad way that includes all the interactions between living things and their surroundings. One of its important functions is allowing for the creation of special buffer zones around national parks to reduce the impact of human activities. This and other features help ensure that development is balanced with conservation.

186. (1) 2nd February
Every year, a special day is set aside to raise global awareness about the importance of wetlands for people and the planet. This event commemorates the anniversary of the adoption of the first international treaty for the conservation of these sensitive ecosystems. By celebrating this day, communities around the world can learn about the many benefits that wetlands provide, such as providing fresh water, protecting coastlines, and supporting an incredible variety of biodiversity.

187. (4) Sambhar Lake
In addition to a famous national park known for its bird life, another large and unique water body in western India is recognized for its international ecological significance. This inland salt lake is one of the largest in the country and provides a critical habitat for many species of migratory birds. Its inclusion on the global list of important wetlands highlights the need for careful management to protect its natural values from external pressures.

188. (1) I, II and III
The protection of sensitive water bodies in India is managed through several national programs and a specific set of rules. These regulations aim to prevent the further degradation of these areas by prohibiting harmful activities like the dumping of solid waste. While some developments are restricted near these sites to maintain their natural character, the primary goal is to ensure that these ecosystems continue to provide essential services like flood control and biodiversity.

189. (3) Mangroves
A specific type of forest grows in the brackish water along tropical coastlines, where the land meets the sea. These hardy trees have special roots that allow them to survive in salty conditions and low-oxygen soil. This unique ecosystem provides a nursery for many types of fish and shellfish and acts as a powerful natural shield against storms and large waves. Because of their many roles, these areas are considered to be critically important.

190. (4) Depletion of dissolved oxygen
When an excessive amount of nutrients enters a water body, it can lead to a condition where the amount of dissolved oxygen becomes very low. This process is driven by the rapid growth and eventual decay of algae and other plants. As bacteria break down this dead organic matter, they consume almost all of the available oxygen. This lack of oxygen is extremely harmful to fish and other aquatic creatures, often leading to die-offs.

191. (1) Urban areas warmer than rural areas
In many large cities, the air and surface temperatures are significantly higher than in the surrounding rural areas. This phenomenon is caused by the way that buildings, roads, and other infrastructure absorb and retain heat from the sun. Additionally, human activities such as driving and using air conditioning release extra heat into the atmosphere. This difference in temperature can have many negative impacts on the local environment, energy use, and health.

192. (2) Low albedo and high heat capacity
The types of materials used to build modern cities play a major role in how much heat is absorbed from the sun. Common surfaces like dark asphalt and concrete have a low ability to reflect sunlight. Instead, they soak up the energy and store it for a long time. This high capacity for holding heat means that city surfaces stay much warmer than natural areas, especially during the night when the stored energy is released.

193. (2) Evapotranspiration
Natural landscapes with plenty of trees and plants help to keep the air cool through a process that involves the movement of water from the leaves into the atmosphere. When large areas of land are paved over and covered with buildings, this natural cooling effect is lost. The absence of vegetation means that less moisture is released into the air, which contributes significantly to the higher temperatures that are characteristic of most urban environments.

194. (1) Traps radiation and reduces wind speed
In cities with many tall buildings located close together, the narrow streets between them can create a unique microclimate. During the day, these deep spaces trap incoming solar radiation, and the surfaces of the buildings continue to release heat long into the night. Additionally, the complex arrangement of the structures can block the natural flow of wind, preventing the hot air

Click Here to Buy book on Amazon

action. It implemented a wide-ranging stop on all extraction activities in the hills across two neighboring states. This decision was based on evidence of severe environmental damage, including the loss of forest cover and the depletion of water resources. The move emphasizes the importance of these hills for maintaining the ecological balance.

178. (1) Both A and R are true and R is the correct explanation of A.
A massive irrigation project has transformed large parts of a previously dry region, allowing for successful farming and economic growth. However, this progress has also brought new environmental challenges. Because the water is applied intensively to soil that does not drain well, it can lead to the ground becoming saturated and salty. This change makes it difficult for crops to grow and can eventually lead to the loss of productive land if not managed properly.

179. (3) Binds soil and provides drought fodder
A specific type of hardy tree is considered a lifeline for people and wildlife in the world's most populous desert region. This deep-rooted species can survive with very little water and provides essential resources during times of drought. Its presence helps to hold the soil in place and reduce erosion, while its leaves and pods offer a nutritious source of food for livestock. Because of its many benefits, the tree is highly valued and protected.

180. (4) Salt extraction and illegal encroachments
A large and unique inland salt lake in western India is facing multiple environmental challenges. The intensive extraction of salt and the expansion of human settlements have disrupted the natural flow of water and harmed the local wildlife, particularly migratory birds. Additionally, the illegal occupation of surrounding land has reduced the size of the lake and its sensitive wetlands. These pressures threaten the long-term health of an ecosystem that is of international importance.

181. (3) A-iv, B-iii, C-ii, D-i
India is home to many wetlands that are recognized for their global ecological importance. These sites are found in diverse landscapes, from the coastal regions of the south and east to the freshwater lakes in the mountains of the northeast and the bird sanctuaries in the dry northern plains. Each of these areas provides essential services such as water filtration, flood control, and habitat for a wide variety of plant and animal species.

182. (2) Marine waters over six meters deep
According to the international agreement for protecting sensitive water-dominated ecosystems, many different areas can be identified as important. This includes inland lakes, rivers, and marshes, as well as coastal areas like coral reefs. However, there is a specific limit for the depth of open ocean water that can be included. Any area where the water is deeper than six meters at low tide is generally not considered to be a wetland.

183. (4) Likely changes in ecological character
As part of an international effort to protect significant wetlands, a specific list is maintained for sites that are facing serious environmental threats. These areas are identified because human activities or other factors have caused, or are likely to cause, a significant change in their natural ecological state. Being on this list allows for focused attention and resources to be directed toward restoring the health of these sensitive ecosystems and ensuring their survival.

184. (1) Loktak Lake
A unique freshwater lake in northeastern India is famous for large masses of vegetation, soil, and organic matter that float on its surface. These natural structures, which can be thick enough to support houses and wildlife, are a critical part of the local ecosystem. The lake provides a habitat for a variety of species, including a rare and endangered type of deer that is only found in this specific area, making it a conservation site.

185. (3) Purify water by trapping pollutants
Wetlands are often described by a term that reflects their vital role in maintaining the health of the environment. Much like a specific human organ, these areas act as a natural filtration system for the planet. As water moves through the dense vegetation and soil of a marsh or swamp, many harmful pollutants and sediments are trapped and broken down. This process ensures that the water that eventually flows out is much cleaner.

Downloaded from www.pdf.tube

169. (3) Environment (Protection) Act, 1986
A voluntary certification system was introduced to help consumers identify products that have a lower environmental impact throughout their lifecycle. This program, which uses a characteristic clay pot symbol, is managed by the national standards body but is authorized under the major environmental protection law of the mid-eighties. By encouraging the production and use of more sustainable goods, the initiative helps to reduce the overall environmental footprint of consumer items and promote sustainability.

170. (1) Grants overarching powers to Center
While laws for air and water were created earlier and focus on specific types of pollution, the legislation passed in nineteen eighty-six is much broader in its scope. Its most significant feature is that it gives the central government a high degree of power to coordinate and direct environmental protection efforts nationwide. This allows for a more unified and effective approach to complex problems that cross state boundaries or involve many different types of environmental media.

171. (2) A, C, D, B
The amount of rain received across a large western state varies significantly from one area to another. The highest amounts are found in the southeast, where the landscape is dominated by plateaus and hills. Moving westward, the climate becomes increasingly dry. The central plains receive a moderate amount of moisture, while the vast sandy regions in the far west are characterized by very low and unpredictable rainfall, which has a profound impact on life.

172. (2) Expansion of the Thar Desert eastwards
The loss of vegetation and soil on an ancient mountain range in western India has serious environmental consequences for the surrounding regions. These hills have historically acted as a natural barrier to the movement of sand and dust. As they become degraded, this shield is weakened, allowing the dry conditions of the west to move further toward the more fertile areas to the east. This process threatens the health of the land and millions.

173. (3) Marble and stone quarrying
Certain regions in a western Indian state are world-famous for their high-quality building stones and decorative materials. However, the intensive and often unscientific extraction of these minerals has led to severe ecological damage. Large-scale quarrying has destroyed the natural landscape, depleted groundwater resources, and generated massive amounts of waste and dust. These changes have disrupted local ecosystems and posed serious health risks to the people living and working in these areas.

174. (4) High natural fluoride in water
Many people in the arid parts of northern and western India suffer from a chronic condition that affects their teeth and bones. This problem is not caused by pollution from factories or farming, but rather by the natural composition of the local geology. In many areas, the deep groundwater contains high levels of a specific mineral. When this water is used for drinking over a long time, it leads to painful and permanent health issues.

175. (3) I and III only
Unscientific extraction activities in a historic mountain range have multiple negative effects on the environment and public health. Beyond destroying the pathways used by wild animals, these activities also release dangerous amounts of fine mineral dust. When people breathe in this dust over many years, it can cause severe lung diseases. Additionally, these mining operations often disrupt the natural flow of water, leading to the depletion of essential groundwater resources in dryland communities.

176. (2) Johad
In the dry regions of western India, people have used clever traditional methods to collect and store rainwater for centuries. One common system involves building small, crescent-shaped embankments across seasonal streams. These structures capture the runoff and allow it to slowly seep into the ground, which recharges the local water table and provides a reliable source for people and livestock. These time-tested techniques are increasingly recognized as essential for surviving in a water-scarce environment.

177. (2) Haryana and Rajasthan
To protect the ancient and ecologically significant mountain range in western India, the highest court in the country has taken strong legal

NODIA

from being dispersed and further increasing the temperatures at the street level.

195. (1) I, II, III and V
Several effective strategies can be used to reduce the higher temperatures found in many cities. These include covering rooftops with vegetation, using light-colored materials for pavements that reflect more sunlight, and significantly increasing the number of trees and parks. Improving the efficiency of buildings and vehicles also helps by reducing the amount of waste heat released. Together, these actions can make urban areas more comfortable, reduce energy demand, and improve public health.

196. (4) Increases cooling energy and emissions
Higher temperatures in urban areas can make environmental pollution even worse. The heat can speed up the chemical reactions that form harmful ground-level ozone from common city emissions. Furthermore, as people use more electricity for air conditioning to stay cool, the power plants that provide that energy often release more pollutants into the air. This combination of heat and smog creates a significant health risk for urban populations during periods of extreme weather.

197. (3) Activities such as vehicles and AC use
A significant amount of the extra heat found in cities comes from the daily activities of the people who live and work there. This includes the energy released by the engines of cars and buses, as well as the heat discarded by air conditioning and heating systems from buildings. Even industrial processes and common appliances contribute to this localized warming. Together, these human sources add a substantial amount of thermal energy to urban environments.

198. (2) Increased flooding and surface runoff
Covering the ground with materials like asphalt and concrete prevents rainwater from soaking into the soil. Instead of replenishing the local groundwater, the water stays on the surface and flows rapidly into drains and nearby streams. During heavy rain, this large volume of fast-moving water can easily overwhelm the drainage systems, leading to frequent and severe flooding in urban areas. This problem also reduces the amount of water available for ecosystems.

199. (4) A-ii, B-iii, C-i, D-iv
Rapid city growth leads to many changes in the environment. Large areas covered with hard surfaces increase the risk of rapid flooding and reduce natural cooling. High volumes of traffic release harmful gases and fine particles that stay trapped near the ground. The loss of parks and lakes further increases local temperatures. Finally, the arrangement of tall buildings creates spaces that trap heat and block the wind, making urban environments hotter and more polluted.

200. (1) Cause: Warmer urban nights; Effect: Increased energy demand for air conditioning
The phenomenon of higher temperatures in cities has several direct consequences for the people who live there. One of the most significant effects is that urban areas do not cool down as much at night as the surrounding countryside. This lack of nighttime cooling means that residents must rely more heavily on mechanical systems to keep their homes and workplaces comfortable. This increased demand for cooling leads to higher energy costs.

www.nodia.in

Click Here to Buy book on Amazon

CHAPTER 07

Biodiversity, Conservation of Natural Resources and Sustainable Development

NODIA

1. Which of the following best defines genetic diversity?
(1) The variety of ecosystems present in a geographical region
(2) The variation of genes and alleles within a single species
(3) The total number of different species in a specific ecological community
(4) The diversity of ecological processes across different biomes
(5) Question not attempted

2. The measurement of biodiversity that focuses on the diversity of species within a particular habitat or ecosystem is known as:
(1) Alpha diversity
(2) Beta diversity
(3) Gamma diversity
(4) Delta diversity
(5) Question not attempted

3. Read the following statements regarding the levels of biodiversity:
I. Genetic diversity helps a species adapt to changing environmental conditions.
II. Ecosystem diversity refers to the variety of habitats, communities, and ecological processes.
III. Species diversity is uniformly distributed across the globe from poles to the equator.
Which of the given statements is/are correct?
(1) I and II only
(2) II and III only
(3) I and III only
(4) I, II and III
(5) Question not attempted

4. Which of the following is a classic example of ecosystem diversity in India?
(1) The presence of distinct breeds of indigenous cattle across India
(2) The existence of thousands of genetic varieties of rice crops
(3) The variation in tiger populations across national parks
(4) The variety of deserts, rainforests, mangroves, and coral reefs
(5) Question not attempted

5. Identify the correct statement regarding biodiversity gradients.
(1) Species diversity generally increases as one moves from the equator towards the poles.
(2) Altitude has no impact on species diversity in mountainous regions.
(3) Species diversity generally decreases as one moves from the equator towards the poles.
(4) Deep ocean floors have higher species diversity than tropical rainforests.
(5) Question not attempted

6. Which region of the world is often referred to as the "lungs of the planet" due to its massive species diversity and ecological significance?
(1) The Western Ghats
(2) The Amazon rainforest
(3) The Taiga forests of Siberia
(4) The Great Barrier Reef
(5) Question not attempted

7. Find the odd one out in the context of biodiversity measurement levels.
(1) Alpha diversity
(2) Beta diversity
(3) Gamma diversity
(4) Biome diversity
(5) Question not attempted

8. Match the following terms in List I with their definitions in List II:
List I: (Term)
A. Alpha diversity

B. Beta diversity
C. Gamma diversity
D. Genetic diversity

List II: (Definition)
i. Overall diversity within a large region or landscape
ii. Diversity within a particular area or ecosystem
iii. Variation of alleles within a population
iv. Change in species composition along an environmental gradient

Options:
(1) A-ii, B-iv, C-i, D-iii
(2) A-i, B-ii, C-iv, D-iii
(3) A-ii, B-i, C-iv, D-iii
(4) A-iv, B-ii, C-iii, D-i
(5) Question not attempted

9. Identify the incorrect statement regarding species diversity.
(1) It comprises aspects of both species richness and species evenness.
(2) Species richness refers to the total number of different species in an area.
(3) An ecosystem with highly uneven species distribution is stable.
(4) Species evenness refers to the relative abundance of each species in an area.
(5) Question not attempted

10. A conservationist notes that two adjacent forest patches have completely different sets of bird species, though the total number of species in each patch is the same. This indicates a high level of:
(1) Beta diversity
(2) Alpha diversity
(3) Genetic diversity
(4) Mutation rate
(5) Question not attempted

11. The concept of "Biodiversity Hotspots" was first proposed by which of the following environmentalists?
(1) Rachel Carson
(2) E.O. Wilson
(3) Vandana Shiva
(4) Norman Myers
(5) Question not attempted

12. Which of the following is NOT one of the four recognized biodiversity hotspots present in India?
(1) The Himalayas
(2) The Vindhyan Range
(3) The Western Ghats
(4) Sundaland
(5) Question not attempted

13. Read the following statements regarding the criteria for a region to qualify as a biodiversity hotspot:
I. It must contain at least 1,500 species of vascular plants as endemics.
II. It must have lost at least 70 percent of its primary native vegetation.
III. It must be located strictly within the tropical latitudes.
IV. It must contain significant megafauna species.

Which of the above statements are correct?
(1) I and II only
(2) II, III and IV only
(3) I, III and IV only
(4) I, II, III and IV
(5) Question not attempted

14. All of the following states in India share parts of the Western Ghats biodiversity hotspot, EXCEPT:
(1) Maharashtra
(2) Karnataka
(3) Kerala
(4) Odisha
(5) Question not attempted

15. The following question consists of two statements, Assertion (A) and Reason (R). Select the correct answer from the options given below:
Assertion (A): The Western Ghats are classified as a biodiversity hotspot.
Reason (R): They host a high degree of endemism and are subjected to significant threat from human activities.
(1) Both A and R are true and R is the correct explanation of A.
(2) Both A and R are true but R is not the correct explanation of A.
(3) A is true but R is false.
(4) A is false but R is true.
(5) Question not attempted

Downloaded from www.pdf.tube

16. The Nicobar Islands of India form a part of which global biodiversity hotspot?
(1) Indo-Burma
(2) Sundaland
(3) Wallacea
(4) The Himalayas
(5) Question not attempted

17. Identify the incorrect pair regarding India's biodiversity hotspots and their prominent regions.
(1) Indo-Burma Hotspot - Northeastern Indian states
(2) Sundaland Hotspot - Lakshadweep Islands
(3) The Himalayas Hotspot - Arunachal Pradesh
(4) Western Ghats - Agasthyamalai Hills
(5) Question not attempted

18. Read the following statements and select the correct option:
Statement I: Endemic species are those that are found exclusively in a particular geographical area and nowhere else.
Statement II: High endemism is a primary requirement for a region to be declared a biodiversity hotspot.
(1) Statement I is correct, and Statement II is incorrect.
(2) Statement I is incorrect, and Statement II is correct.
(3) Both Statement I and Statement II are correct.
(4) Both Statement I and Statement II are incorrect.
(5) Question not attempted

19. Which among the following best describes the ecological significance of a biodiversity hotspot?
(1) It is a geographic area with a permanent human population of zero.
(2) It is a legally protected area where all forms of tourism are entirely banned.
(3) A region with high species richness, endemism, and threat of destruction.
(4) It is a geographical region created artificially to breed various endangered species.
(5) Question not attempted

20. What is a direct ecological consequence of habitat destruction in a biodiversity hotspot?
(1) Rapid increase in the total population of endemic species
(2) Substantial expansion of the primary native vegetation
(3) Significant decrease in the introduction of invasive species
(4) Accelerated rate of local and global species extinction
(5) Question not attempted

21. The International Union for Conservation of Nature (IUCN) maintains the Red List of Threatened Species. In which year was the IUCN established?
(1) 1964
(2) 1972
(3) 1948
(4) 1992
(5) Question not attempted

22. Arrange the following IUCN Red List categories in order of increasing risk of extinction:
I. Endangered (EN)
II. Vulnerable (VU)
III. Extinct in the Wild (EW)
IV. Critically Endangered (CR)
Which of the following is the correct sequence?
(1) II, I, IV, III
(2) I, II, III, IV
(3) II, IV, I, III
(4) IV, I, II, III
(5) Question not attempted

NODIA

23. Read the following criteria used by the IUCN:
I. An observed, estimated, inferred or suspected population size reduction of 90% or more over the last 10 years.
II. Extent of occurrence estimated to be less than 100 square kilometres.
III. Population size estimated to number fewer than 250 mature individuals.
IV. Quantitative analysis showing the probability of extinction in the wild is at least 50% within 10 years.
V. Population size estimated to number fewer than 50 mature individuals.
Which combination of the above represents criteria that can independently classify a species as 'Critically Endangered' (CR)?
(1) I, II and III only
(2) II, III and V only

(3) I, III, IV and V only
(4) I, II, III, IV and V
(5) Question not attempted

24. A wildlife biologist finds that a specific frog species has not been seen in its natural habitat for 60 years, despite exhaustive surveys. However, a small population survives in a research terrarium. Under which IUCN category should this species be listed?
(1) Extinct in the Wild
(2) Critically Endangered
(3) Extinct
(4) Data Deficient
(5) Question not attempted

25. Identify the correct pair of species and its general IUCN status (as commonly cited in Indian context):
(1) Great Indian Bustard - Least Concern
(2) Snow Leopard - Extinct
(3) Pygmy Hog - Critically Endangered
(4) Olive Ridley Turtle - Extinct in the Wild
(5) Question not attempted

26. Match the following IUCN categories in List I with their descriptions in List II:
List I: (IUCN Category)
A. Extinct (EX)
B. Data Deficient (DD)
C. Near Threatened (NT)
D. Least Concern (LC)
List II: (Description)
i. Close to qualifying for a threatened category in the near future
ii. Widespread and abundant taxa
iii. No reasonable doubt that the last individual has died
iv. Inadequate information to make a direct, or indirect, assessment of its risk of extinction
Options:
(1) A-iii, B-iv, C-i, D-ii
(2) A-iv, B-iii, C-ii, D-i
(3) A-iii, B-i, C-iv, D-ii
(4) A-ii, B-iv, C-i, D-iii
(5) Question not attempted

27. According to the IUCN Red List, a species is classified as "Vulnerable" when it:
(1) Faces an extremely high risk of extinction in the wild in the immediate future.
(2) Faces a very high risk of extinction in the wild in the near-term future.
(3) Faces a high risk of extinction in the wild in the medium-term future.
(4) Likely to become endangered unless threatening circumstances improve.
(5) Question not attempted

28. Identify the incorrect statement regarding the IUCN Red List.
(1) It evaluates the extinction risk of thousands of species and subspecies.
(2) It relies solely on qualitative data and ignores quantitative criteria like population reduction.
(3) Species classified as Vulnerable, Endangered, and Critically Endangered are collectively considered "Threatened".
(4) The Red List is used by government agencies to guide conservation policies.
(5) Question not attempted

29. The publication documenting the rare and endangered species of animals and plants, maintained internationally, is known as:
(1) The Green Data Book
(2) The Yellow Data Book
(3) The Red Data Book
(4) The Blue Data Book
(5) Question not attempted

30. Which of the following is NOT a recognized category in the IUCN Red List?
(1) Not Evaluated
(2) Data Deficient
(3) Critically Endangered
(4) Ecological Exception
(5) Question not attempted

31. Following the Wildlife (Protection) Amendment Act, 2022, how many schedules does the Wildlife Protection Act, 1972 now contain?
(1) Four
(2) Five
(3) Six
(4) Seven
(5) Question not attempted

32. Read the following statements regarding the Wildlife Protection Act, 1972:
I. It provides the legal framework for the

Click Here to Buy book on Amazon

establishment of National Parks and Wildlife Sanctuaries.
II. It allows for the completely unregulated hunting of Schedule I animals for sports.
III. It prohibits the trade and commerce of wild animals, animal articles, and trophies of protected species.

Which of the given statements is/are incorrect?
(1) I only
(2) II only
(3) II and III only
(4) I and III only
(5) Question not attempted

33. Match the following provisions in List I with their descriptions in List II based on the Wildlife Protection Act, 1972 (post-2022 amendment):
List I: (Provisions under WPA 1972)
A. Schedule I
B. Schedule II
C. Schedule III
D. Schedule IV
List II: (Description)
i. Animal species requiring lesser protection
ii. Animal species requiring the highest level of protection
iii. Specimens listed in the Appendices under CITES
iv. Protected Plant species
Options:
(1) A-ii, B-i, C-iv, D-iii
(2) A-i, B-ii, C-iii, D-iv
(3) A-ii, B-iv, C-i, D-iii
(4) A-iv, B-i, C-ii, D-iii
(5) Question not attempted

34. Read the following statements and select the correct option:
Statement I: The Wildlife Protection Act, 1972 empowers the State Government to declare any area as a Sanctuary or National Park.
Statement II: The Central Government cannot declare any area as a Sanctuary or National Park under any circumstances.
(1) Statement I is correct, and Statement II is incorrect.
(2) Statement I is incorrect, and Statement II is correct.
(3) Both Statement I and Statement II are correct.
(4) Both Statement I and Statement II are incorrect.
(5) Question not attempted

35. Under the Wildlife Protection Act, 1972, who is the highest statutory authority at the state level responsible for the management of wildlife?
(1) The Chief Minister
(2) The State Forest Minister
(3) The Chief Wildlife Warden
(4) The Inspector General of Forests
(5) Question not attempted

36. The following question consists of two statements, Assertion (A) and Reason (R). Select the correct answer from the options given below:
Assertion (A): The Wildlife (Protection) Amendment Act, 2022 included a new schedule specifically for CITES listed species.
Reason (R): India is a signatory to CITES and is obligated to implement its provisions to regulate international trade in endangered species.
(1) Both A and R are true and R is the correct explanation of A.
(2) Both A and R are true but R is not the correct explanation of A.
(3) A is true but R is false.
(4) A is false but R is true.
(5) Question not attempted

37. All of the following authorities are constituted under the Wildlife Protection Act, 1972, EXCEPT:
(1) National Board for Wildlife
(2) Central Zoo Authority
(3) National Green Tribunal
(4) National Tiger Conservation Authority
(5) Question not attempted

NODIA

38. What was the primary effect of eliminating the 'Vermin' schedule in the Wildlife (Protection) Amendment Act, 2022?
(1) All vermin species can now be hunted freely without any prior government notification
(2) Central Government can declare specific non-Schedule I/II species as vermin by notification
(3) State governments now possess the power to arbitrarily classify tigers as vermin species
(4) No wild animal or bird species can ever be culled or hunted in any region of India again

(5) Question not attempted

39. Prior to the 2022 amendment, which Schedule of the Wildlife Protection Act, 1972 was specifically dedicated to "Vermin" (animals that could be hunted)?
(1) Schedule III
(2) Schedule IV
(3) Schedule VI
(4) Schedule V
(5) Question not attempted

40. Identify the correct statement regarding the National Board for Wildlife (NBWL).
(1) It is chaired by the Prime Minister of India.
(2) It is a statutory body constituted under the Environment (Protection) Act, 1986.
(3) It is chaired by the Minister of Environment, Forest and Climate Change.
(4) Its recommendations are merely advisory and never mandatory for altering National Park boundaries.
(5) Question not attempted

41. In which year was "Project Tiger" launched in India to promote the conservation of the Bengal Tiger?
(1) 1972
(2) 1980
(3) 1973
(4) 1992
(5) Question not attempted

42. Read the following list of Tiger Reserves in India:
I. Bandipur
II. Jim Corbett
III. Kanha
IV. Manas
Which combination of the above were among the initial 9 tiger reserves declared during the launch of Project Tiger?
(1) I and II only
(2) II, III and IV only
(3) I, II and III only
(4) I, II, III and IV
(5) Question not attempted

43. Which statutory body was established in 2005 to strengthen tiger conservation and manage Project Tiger?
(1) National Board for Wildlife
(2) Wildlife Institute of India
(3) Animal Welfare Board of India
(4) National Tiger Conservation Authority (NTCA)
(5) Question not attempted

NODIA

44. Identify the incorrect statement regarding tiger census methods in India.
(1) Historically, the pugmark method was solely relied upon for counting tigers.
(2) Tiger census in India is conducted annually across all reserves.
(3) Currently, camera trapping and DNA analysis are extensively used for accurate estimation.
(4) The M-STrIPES application is used for monitoring tiger patrols and ecological data.
(5) Question not attempted

45. Match the following Tiger Reserves in List I with their corresponding states in List II:
List I: (Tiger Reserve)
A. Dampa
B. Pakke
C. Satkosia
D. Pilibhit
List II: (State)
i. Arunachal Pradesh
ii. Mizoram
iii. Uttar Pradesh
iv. Odisha
Options:
(1) A-ii, B-i, C-iv, D-iii
(2) A-i, B-ii, C-iii, D-iv
(3) A-ii, B-iv, C-i, D-iii
(4) A-iv, B-iii, C-i, D-ii
(5) Question not attempted

46. What is the most appropriate description of the core-buffer strategy used in Project Tiger?
(1) Core areas are for regulated eco-tourism, while buffer areas are strictly protected habitats.
(2) Both core and buffer areas allow large-scale mining operations under government supervision.
(3) Core areas are dedicated to herbivore breeding, while buffer areas are reserved for predators.
(4) Strictly protected core areas with no human

I. Jammu & Kashmir and Ladakh
II. Himachal Pradesh
III. Sikkim
Which combination represents the natural habitat of the Snow Leopard in India?
(1) I and II only
(2) II and III only
(3) I and III only
(4) I, II and III
(5) Question not attempted

63. Read the following statements regarding the Gangetic Dolphin (Platanista gangetica):
I. It is essentially blind and relies on echolocation to navigate and hunt.
II. It is found only in the freshwater river systems of India, Nepal, and Bangladesh.
III. It is classified as "Critically Endangered" by the IUCN.
IV. It was designated as the National Aquatic Animal of India in 2009.
Which combination of the above statements is correct?
(1) I, II and IV only
(2) I, III and IV only
(3) II, III and IV only
(4) I, II, III and IV
(5) Question not attempted

64. Identify the correct statement regarding Project Dolphin.
(1) It was launched to protect exclusively marine dolphins in the Arabian Sea.
(2) It focuses on both riverine and marine dolphins and involves community participation.
(3) It was initiated by the World Bank as part of a global oceanic cleanup.
(4) It aims to relocate all river dolphins to captive aquariums.
(5) Question not attempted

65. The Vikramshila Gangetic Dolphin Sanctuary, India's only sanctuary for the Gangetic dolphin, is located in which state?
(1) Uttar Pradesh
(2) Bihar
(3) West Bengal
(4) Assam
(5) Question not attempted

66. Match the following species in List I with their associated rivers or regions in List II:
List I: (Species)
A. Gangetic Dolphin
B. Indus River Dolphin
C. Irrawaddy Dolphin
D. Snow Leopard
List II: (Associated River/Region)
i. Chilika Lake
ii. Beas River
iii. Brahmaputra River
iv. Hemis National Park
Options:
(1) A-iii, B-ii, C-i, D-iv
(2) A-ii, B-iii, C-iv, D-i
(3) A-iii, B-i, C-ii, D-iv
(4) A-iv, B-ii, C-i, D-iii
(5) Question not attempted

67. Identify the incorrect statement regarding the Snow Leopard.
(1) It is known as the "Ghost of the Mountains."
(2) It is an indicator species for the health of high-altitude ecosystems.
(3) It frequently roars loudly to establish territory.
(4) Its major prey includes blue sheep (bharal) and ibex.
(5) Question not attempted

68. The presence of a healthy population of Gangetic dolphins in a river segment indicates:
(1) High levels of toxic industrial pollution throughout the river segment.
(2) High salinity and mineral content in the water of the river segment.
(3) Absence of various fish species within that particular river segment.
(4) High level of health and biodiversity in the freshwater ecosystem.
(5) Question not attempted

69. Find the odd one out concerning flagship conservation projects in India.
(1) Project Tiger
(2) Project Elephant
(3) Project Cheetah
(4) Project Snow Leopard
(5) Question not attempted

Downloaded from www.pdf.tube

(5) Question not attempted

55. Match the following Elephant Reserves in List I with their corresponding states in List II:
List I: (Elephant Reserve)
A. Lemru
B. Shivalik
C. Nilgiri
D. Singhbhum
List II: (State)
i. Uttarakhand
ii. Chhattisgarh
iii. Jharkhand
iv. Tamil Nadu
Options:
(1) A-ii, B-i, C-iv, D-iii
(2) A-i, B-ii, C-iii, D-iv
(3) A-iii, B-i, C-iv, D-ii
(4) A-ii, B-iii, C-iv, D-i
(5) Question not attempted

56. Read the following statements and select the correct option:
Statement I: Asian elephants are listed as "Endangered" on the IUCN Red List.
Statement II: African elephants have higher global populations compared to Asian elephants.
(1) Statement I is correct, and Statement II is incorrect.
(2) Statement I is incorrect, and Statement II is correct.
(3) Both Statement I and Statement II are correct.
(4) Both Statement I and Statement II are incorrect.
(5) Question not attempted

57. Identify the incorrect statement regarding elephant conservation in India.
(1) Karnataka currently maintains the highest population of wild Asian elephants in all of India.
(2) The Asian elephant has been officially designated as the National Heritage Animal of India.
(3) Indigenous communities are legally permitted to trade elephant ivory under the WPA 1972.
(4) Project Elephant provides comprehensive financial and technical support to various states.
(5) Question not attempted

58. An "Elephant Corridor" is best defined as:
(1) Narrow land strips connecting larger habitats to allow safe elephant movement between them.
(2) A fenced enclosure within a public zoo used specifically for breeding endangered elephants.
(3) A permanent railway track passing through a notified elephant reserve or forest area.
(4) A designated market area where captive elephants are legally traded for cultural events.
(5) Question not attempted

59. All of the following are primary causes of human-elephant conflict in India, EXCEPT:
(1) The extensive fragmentation and degradation of natural elephant habitats.
(2) Encroachment into forest lands for agricultural expansion and settlement.
(3) Linear infrastructure development like railways and highways through forests.
(4) Massive overpopulation caused by the high reproductive rate of elephants.
(5) Question not attempted

60. The increasing installation of early warning systems and solar electric fences near forest fringes is a direct effect of:
(1) The demand for renewable energy in tribal villages
(2) Rising incidents of human-elephant conflicts and crop raiding
(3) Government mandates to secure international borders
(4) Attempts to keep invasive plant species out of agricultural lands
(5) Question not attempted

61. Project Snow Leopard was launched by the Government of India in which year?
(1) 1992
(2) 2000
(3) 2009
(4) 2014
(5) Question not attempted

62. Read the following list of Indian states/Union Territories:

NODIA

94. Identify the correct pair of conservation method and its type.
(1) Wildlife Sanctuary - Ex-situ conservation
(2) Zoological Park - In-situ conservation
(3) Tissue Culture - In-situ conservation
(4) Sacred Grove - In-situ conservation
(5) Question not attempted

95. Match the following examples in List I with their types of conservation in List II:
List I: (Example)
A. National Park
B. Gene Bank
C. Sacred Lake
D. Aquarium
List II: (Type of Conservation)
i. In-situ conservation (Government protected)
ii. Ex-situ conservation (Live aquatic species)
iii. Ex-situ conservation (Genetic material)
iv. In-situ conservation (Community protected)
Options:
(1) A-i, B-iii, C-iv, D-ii
(2) A-ii, B-iv, C-i, D-iii
(3) A-i, B-iv, C-iii, D-ii
(4) A-iv, B-iii, C-ii, D-i
(5) Question not attempted

96. Identify the incorrect statement regarding seed banks.
(1) They are a recognized form of ex-situ biodiversity conservation.
(2) Seeds are stored at high temperatures and humidity to ensure survival.
(3) They store seeds to preserve genetic diversity for future recovery.
(4) The Svalbard Global Seed Vault is a prominent example of a seed bank.
(5) Question not attempted

97. Which of the following is the most appropriate reason for using cryopreservation in biodiversity conservation?
(1) To freeze entire planetary ecosystems to halt the effects of climate change.
(2) To preserve genetic material at ultra-low temperatures without loss of viability.
(3) To cool the natural habitats of polar bears and other arctic animals in zoos.
(4) To preserve dead specimens of extinct animals for educational museum display.
(5) Question not attempted

98. Botanical gardens play a significant role in conservation by:
(1) Acting as ex-situ conservation centers for rare and threatened plant species.
(2) Serving as natural habitats for large carnivorous mammals and predators.
(3) Acting as the strictly protected core zone of major biosphere reserves.
(4) Providing timber for commercial industrial use and economic development.
(5) Question not attempted

99. Severe and irreversible fragmentation of a species' natural habitat often leads conservationists to:
(1) Abandon all conservation efforts entirely due to habitat loss.
(2) Rely solely on in-situ conservation methods despite the risks.
(3) Start ex-situ measures like captive breeding to prevent imminent extinction.
(4) Introduce invasive species to restore the natural ecological balance.
(5) Question not attempted

100. Find the odd one out in the context of in-situ conservation.
(1) Wildlife Sanctuary
(2) National Park
(3) Marine Protected Area
(4) Zoological Garden
(5) Question not attempted

101. The Convention on Biological Diversity (CBD) was opened for signature at which major global event?
(1) The Stockholm Conference, 1972
(2) The Johannesburg Summit, 2002
(3) The Earth Summit (UNCED) in Rio de Janeiro, 1992
(4) The Paris Climate Conference, 2015
(5) Question not attempted

102. Read the following statements regarding the Convention on Biological Diversity (CBD):
I. It is a legally binding international treaty.
II. Its objective is the conservation of biological diversity.
III. Its objective includes the sustainable use of

Click Here to Buy book on Amazon

70. Read the following statements and select the correct option:
Statement I: Snow Leopards are threatened primarily by retaliatory killing by herders, poaching, and climate change.
Statement II: The Global Snow Leopard and Ecosystem Protection Program (GSLEP) is an intergovernmental alliance of range countries.
(1) Statement I is correct, and Statement II is incorrect.
(2) Statement I is incorrect, and Statement II is correct.
(3) Both Statement I and Statement II are correct.
(4) Both Statement I and Statement II are incorrect.
(5) Question not attempted

71. The primary legal difference between a National Park and a Wildlife Sanctuary in India is:
(1) National Parks allow human settlements, while Sanctuaries prohibit them.
(2) Sanctuaries offer a higher degree of protection than most National Parks.
(3) National Parks are created by the Centre, and Sanctuaries by States.
(4) Rights allowed in Sanctuaries but strictly prohibited in National Parks.
(5) Question not attempted

72. Match the following Biosphere Reserves in List I with their corresponding states in List II:
List I: (Biosphere Reserve)
A. Nanda Devi
B. Nokrek
C. Pachmarhi
D. Similipal
List II: (State)
i. Meghalaya
ii. Uttarakhand
iii. Odisha
iv. Madhya Pradesh
Options:
(1) A-ii, B-i, C-iv, D-iii
(2) A-i, B-ii, C-iii, D-iv
(3) A-ii, B-iv, C-i, D-iii
(4) A-iv, B-iii, C-ii, D-i
(5) Question not attempted

73. Arrange the zones of a Biosphere Reserve from the outermost area to the innermost protected area:
I. Buffer Zone
II. Transition Area
III. Core Zone
Which of the following represents the correct sequence?
(1) I, II, III
(2) II, I, III
(3) III, I, II
(4) II, III, I
(5) Question not attempted

74. Read the following list of Biosphere Reserves in India:
I. Nilgiri
II. Gulf of Mannar
III. Sunderban
IV. Nanda Devi
V. Panna
Which combination represents those recognized under the UNESCO Man and the Biosphere (MAB) program?
(1) I, II and III only
(2) I, III and V only
(3) II, IV and V only
(4) I, II, III, IV and V
(5) Question not attempted

75. Which is the first National Park established in India?
(1) Kanha National Park
(2) Kaziranga National Park
(3) Ranthambore National Park
(4) Hailey National Park (now Jim Corbett)
(5) Question not attempted

NODIA

76. Identify the correct statement regarding Community Reserves.
(1) They can only be declared on land completely owned by the State.
(2) Private or community lands protected for flora, fauna, and traditions.
(3) They offer a much higher level of protection than National Parks.
(4) Commercial hunting is explicitly permitted within these reserves.
(5) Question not attempted

(3) Living Modified Organism
(4) Limited Mutation Organism
(5) Question not attempted

110. A foreign pharmaceutical company wants to use a medicinal plant native to the Western Ghats to develop a new drug. Under CBD principles, which principle mandates that the company must share profits with India?
(1) The Precautionary Principle
(2) Polluter Pays Principle
(3) Extended Producer Responsibility
(4) Access and Benefit Sharing (ABS)
(5) Question not attempted

111. The Nagoya Protocol primarily addresses which of the three main objectives of the Convention on Biological Diversity (CBD)?
(1) Fair and equitable sharing of benefits from the use of genetic resources.
(2) The conservation of biological diversity and natural ecosystems.
(3) The sustainable use of various biological and genetic components.
(4) Prohibition of transboundary movement of various hazardous wastes.
(5) Question not attempted

112. The Nagoya Protocol was adopted in the year 2010 in which country?
(1) Brazil
(2) Japan
(3) Switzerland
(4) Canada
(5) Question not attempted

113. Read the following core obligations set out by the Nagoya Protocol for its contracting parties:
I. Access obligations
II. Benefit-sharing obligations
III. Compliance obligations
Which combination represents the key pillars of the Nagoya Protocol?
(1) I and II only
(2) II and III only
(3) I and III only
(4) I, II and III
(5) Question not attempted

114. In India, which statutory body is responsible for granting approval for access to biological resources and associated traditional knowledge for commercial utilization by foreign entities under the ABS mechanism?
(1) National Biodiversity Authority (NBA)
(2) Ministry of Earth Sciences
(3) NITI Aayog
(4) Council of Scientific and Industrial Research (CSIR)
(5) Question not attempted

115. Identify the correct statement regarding terms under the Nagoya Protocol.
(1) Mutually Agreed Terms (MAT) - A unilateral declaration by the user country dictating payment terms.
(2) Bioprospecting - The protection of wildlife from poachers.
(3) Prior Informed Consent (PIC) - Permission obtained from the provider country before accessing genetic resources.
(4) Traditional Knowledge - Modern scientific research published in peer-reviewed journals.
(5) Question not attempted

116. Read the following statements and select the correct option:
Statement I: The Nagoya Protocol requires user countries to ensure that genetic resources utilized within their jurisdiction have been accessed in accordance with Prior Informed Consent.
Statement II: The Nagoya Protocol completely ignores the rights of indigenous and local communities over their traditional knowledge.
(1) Statement I is correct, and Statement II is incorrect.
(2) Statement I is incorrect, and Statement II is correct.
(3) Both Statement I and Statement II are correct.
(4) Both Statement I and Statement II are incorrect.
(5) Question not attempted

117. Identify the incorrect statement regarding the Nagoya Protocol.
(1) It provides a transparent legal framework for the effective implementation of the CBD's third objective.
(2) It entered into force in October 2014.

Downloaded from www.pdf.tube

UNESCO in the year 2004.
(4) World's first reserve to successfully re-establish tigers through relocation.
(5) Question not attempted

85. Mukundra Hills (Darrah), declared as a Tiger Reserve in Rajasthan, is primarily spread across which districts?
(1) Jaipur and Alwar
(2) Jodhpur and Bikaner
(3) Kota, Bundi, Chittorgarh and Jhalawar
(4) Udaipur and Rajsamand
(5) Question not attempted

86. Which type of vegetation is most dominant in the Desert National Park of Rajasthan?
(1) Tropical moist deciduous forests
(2) Tropical thorn forests and scrublands
(3) Montane subtropical forests
(4) Mangrove forests
(5) Question not attempted

87. Read the following statements and select the correct option:
Statement I: Keoladeo National Park was formerly known as Bharatpur Bird Sanctuary.
Statement II: Keoladeo National Park is recognized as a Ramsar Wetland site and a UNESCO World Heritage Site.
(1) Statement I is correct, and Statement II is incorrect.
(2) Statement I is incorrect, and Statement II is correct.
(3) Both Statement I and Statement II are correct.
(4) Both Statement I and Statement II are incorrect.
(5) Question not attempted

88. Arrange the following National Parks/Tiger Reserves of Rajasthan from East to West:
I. Ranthambore
II. Keoladeo
III. Desert National Park
Which of the following represents the correct sequence?
(1) I, II, III
(2) II, I, III
(3) III, I, II
(4) II, III, I
(5) Question not attempted

89. Which of the following is NOT a notified Tiger Reserve in Rajasthan as of 2023?
(1) Ranthambore
(2) Sariska
(3) Kumbhalgarh
(4) Ramgarh Vishdhari
(5) Question not attempted

90. Find the odd one out regarding the biodiversity of Rajasthan.
(1) Sangai (State Animal - Domestic)
(2) Khejri (State Tree)
(3) Rohida (State Flower)
(4) Chinkara (State Animal - Wild)
(5) Question not attempted

91. In-situ conservation refers to:
(1) Conservation of genetic resources outside their natural habitat.
(2) Preservation of plant seeds in a controlled cryogenic environment.
(3) Keeping endangered animals exclusively in zoological parks.
(4) Conservation of species within their natural ecosystem or habitat.
(5) Question not attempted

92. Ex-situ conservation is best defined as:
(1) The protection of ecosystems through the creation of National Parks.
(2) Maintenance and breeding of endangered species outside natural habitats.
(3) The protection of wildlife through strict anti-poaching forest laws.
(4) The natural evolutionary process of adaptation within ecosystems.
(5) Question not attempted

93. Read the following list of conservation methods:
I. Seed Banks
II. Botanical Gardens
III. Biosphere Reserves
IV. Cryopreservation
Which combination represents ex-situ conservation methods?
(1) I, II and III only
(2) II, III and IV only
(3) I, II and IV only
(4) I, II, III and IV
(5) Question not attempted

NODIA

77. Identify the incorrect statement regarding the Protected Area Network.
(1) Core Zone of Biosphere Reserve - Strictly protected, no human activity
(2) Buffer Zone - Used for cooperative activities like research and education
(3) Wildlife Sanctuary - Complete ban on collection of minor forest produce
(4) Transition Zone - Area of active cooperation between reserve management and local people
(5) Question not attempted

78. The following question consists of two statements, Assertion (A) and Reason (R). Select the correct answer from the options given below:
Assertion (A): Conservation Reserves act as buffer zones or migration corridors between established national parks and sanctuaries.
Reason (R): They are typically declared on government-owned land adjacent to national parks and sanctuaries to enhance landscape-level conservation.
(1) Both A and R are true and R is the correct explanation of A.
(2) Both A and R are true but R is not the correct explanation of A.
(3) A is true but R is false.
(4) A is false but R is true.
(5) Question not attempted

79. All of the following are recognized Biosphere Reserves in India, EXCEPT:
(1) Chilika Lake
(2) Cold Desert
(3) Seshachalam Hills
(4) Achanakmar-Amarkantak
(5) Question not attempted

80. What is the most appropriate purpose of declaring Eco-Sensitive Zones (ESZs) around National Parks and Wildlife Sanctuaries?
(1) To promote heavy industrialization close to forests for the economy.
(2) A transition zone acting as a 'shock absorber' for protected areas.
(3) To permanently relocate all human populations within a 100 km radius.
(4) To expand the core area of the park without any legal notification.
(5) Question not attempted

81. The Desert National Park in Rajasthan is famous for harboring a significant population of which critically endangered state bird?
(1) Sarus Crane
(2) Great Indian Bustard (Godawan)
(3) Lesser Florican
(4) Indian Vulture
(5) Question not attempted

82. Read the following statements regarding Ranthambore National Park:
I. It is situated at the junction of the Aravalli and Vindhya hill ranges.
II. It is renowned for its Bengal Tiger population.
III. It is located in the Jaisalmer district of Rajasthan.
Which of the given statements is/are correct?
(1) I and II only
(2) II and III only
(3) I and III only
(4) I, II and III
(5) Question not attempted

83. Match the following Protected Areas in Rajasthan in List I with their key features or species in List II:
List I: (Protected Area in Rajasthan)
A. Keoladeo National Park
B. Desert National Park
C. Sitamata Wildlife Sanctuary
D. Tal Chhapar Sanctuary
List II: (Key Feature/Species)
i. Flying Squirrel
ii. Blackbuck
iii. Siberian Crane (historically wintering site)
iv. Great Indian Bustard
Options:
(1) A-iii, B-iv, C-i, D-ii
(2) A-i, B-ii, C-iii, D-iv
(3) A-iii, B-i, C-ii, D-iv
(4) A-iv, B-iii, C-i, D-ii
(5) Question not attempted

84. Which of the following statements about Sariska Tiger Reserve is correct?
(1) It does not harbor any leopard population within its boundaries.
(2) It is located in the Thar desert region of far western Rajasthan.
(3) It was declared a World Heritage Site by

Click Here to Buy book on Amazon

the components of biological diversity.
IV. Its objective includes the fair and equitable sharing of benefits arising from genetic resources.
V. It strictly prohibits sovereign nations from utilizing their own biological resources.

Which combination represents the true objectives and nature of the CBD?
(1) I, II and III only
(2) II, III and IV only
(3) I, II, III and IV only
(4) I, II, III, IV and V
(5) Question not attempted

103. The Cartagena Protocol, adopted under the CBD, primarily deals with:
(1) Access and fair benefit-sharing of various genetic resources.
(2) The reduction of greenhouse gas emissions by industrial nations.
(3) The elimination of single-use plastics from global trade routes.
(4) Safe handling, transport, and use of Living Modified Organisms (LMOs).
(5) Question not attempted

104. Which of the following statements about the Aichi Biodiversity Targets is correct?
(1) A set of 20 time-bound targets from 2010 to halt biodiversity loss by 2020.
(2) They consisted of 50 targets to be achieved globally by the year 2050.
(3) They exclusively targeted marine biodiversity conservation in the oceans.
(4) India refused to endorse the Aichi Targets at the Nagoya conference.
(5) Question not attempted

105. Read the following statements and select the correct option:
Statement I: India enacted the Biological Diversity Act in 2002.
Statement II: The Biological Diversity Act, 2002 was enacted to fulfill India's obligations under the Convention on Biological Diversity (CBD).
(1) Statement I is correct, and Statement II is incorrect.
(2) Statement I is incorrect, and Statement II is correct.
(3) Both Statement I and Statement II are correct.
(4) Both Statement I and Statement II are incorrect.
(5) Question not attempted

106. Identify the incorrect statement regarding the implementation of the Biological Diversity Act, 2002 in India.
(1) It allows foreign individuals to access India's biological resources freely without any prior approval.
(2) It established the National Biodiversity Authority (NBA).
(3) It mandated the creation of State Biodiversity Boards (SBBs).
(4) It mandated the formation of Biodiversity Management Committees (BMCs) at the local level.
(5) Question not attempted

107. All of the following are protocols/frameworks directly associated with the Convention on Biological Diversity, EXCEPT:
(1) Cartagena Protocol
(2) Nagoya Protocol
(3) Kunming-Montreal Global Biodiversity Framework
(4) Kyoto Protocol
(5) Question not attempted

108. The following question consists of two statements, Assertion (A) and Reason (R). Select the correct answer from the options given below:
Assertion (A): The CBD recognizes that States have sovereign rights over their own biological resources.
Reason (R): Prior to the CBD, genetic resources were widely considered as the "common heritage of mankind," leading to their unregulated exploitation by foreign entities.
(1) Both A and R are true and R is the correct explanation of A.
(2) Both A and R are true but R is not the correct explanation of A.
(3) A is true but R is false.
(4) A is false but R is true.
(5) Question not attempted

109. Under the Cartagena Protocol, what does "LMO" stand for?
(1) Large Marine Organism
(2) Local Micro Organism

Downloaded from www.pdf.tube

activity and buffers allowing local co-existence.
(5) Question not attempted

47. Arrange the following Tiger Reserves from North to South in India:
I. Bandhavgarh
II. Corbett
III. Periyar
IV. Pench
Which of the following represents the correct sequence?
(1) II, I, IV, III
(2) I, II, IV, III
(3) II, IV, I, III
(4) IV, I, II, III
(5) Question not attempted

48. Find the odd one out among the following protected areas in Rajasthan (in the context of Tiger Reserves).
(1) Ranthambore
(2) Tal Chhapar
(3) Sariska
(4) Mukundra Hills
(5) Question not attempted

49. Identify the correct statement regarding tiger conservation milestones.
(1) First Tiger Census using Camera Traps - 1973
(2) Establishment of NTCA - Wildlife Protection Amendment Act 2006
(3) Global Tiger Day - August 12
(4) St. Petersburg Declaration - Goal to halve tiger population by 2022
(5) Question not attempted

50. If a proposed highway is planned to cut directly through the core zone of a Tiger Reserve, which authority's explicit recommendation is mandatory for project clearance under the Wildlife Protection Act?
(1) National Tiger Conservation Authority
(2) National Green Tribunal
(3) Central Zoo Authority
(4) State Pollution Control Board
(5) Question not attempted

51. Project Elephant, a centrally sponsored scheme, was launched by the Government of India in the year:
(1) 1973
(2) 1986
(3) 1992
(4) 2002
(5) Question not attempted

52. Read the following objectives regarding conservation:
I. To protect elephants, their habitat, and corridors.
II. To address issues of man-animal conflict.
III. To ensure the welfare of captive elephants.
IV. To promote the commercial trade of ivory.
V. To relocate all wild elephants to zoological parks.
Which combination represents the true objectives of Project Elephant?
(1) I, II and III only
(2) II, III and IV only
(3) I, III, IV and V only
(4) I, II, III, IV and V
(5) Question not attempted

53. The MIKE programme, established under CITES, stands for:
(1) Management of Indian Keystone Elephants
(2) Measurement of Ivory and Keystone Ecology
(3) Monitoring the Illegal Killing of Elephants
(4) Mitigation of Interstate Killing of Elephants
(5) Question not attempted

54. The following question consists of two statements, Assertion (A) and Reason (R). Select the correct answer from the options given below:
Assertion (A): The protection of elephant corridors is crucial for the long-term survival of the Asian Elephant.
Reason (R): Elephants are mega-herbivores requiring vast ranges, and corridors prevent genetic isolation and reduce human-elephant conflict.
(1) Both A and R are true and R is the correct explanation of A.
(2) Both A and R are true but R is not the correct explanation of A.
(3) A is true but R is false.
(4) A is false but R is true.

NODIA

(3) It applies exclusively to human genetic resources.
(4) India is a signatory and has ratified the Nagoya Protocol.
(5) Question not attempted

118. Which of the following is the most appropriate description of how traditional knowledge is treated under the Nagoya Protocol?
(1) It is considered public domain and free for anyone to use commercially.
(2) Access to traditional knowledge must be subject to prior informed consent.
(3) It is strictly banned from being used in any modern medical practices.
(4) Only the central government can claim ownership of all local knowledge.
(5) Question not attempted

119. The strict implementation of Access and Benefit Sharing (ABS) mechanisms under the Nagoya Protocol is primarily a direct response to combat:
(1) Deforestation
(2) Desertification
(3) Marine pollution
(4) Biopiracy
(5) Question not attempted

120. Find the odd one out in the context of international environmental agreements dealing with biodiversity.
(1) Montreal Protocol
(2) Convention on Biological Diversity (CBD)
(3) Nagoya Protocol
(4) Cartagena Protocol
(5) Question not attempted

121. The most widely accepted definition of "Sustainable Development" is "Development that meets the needs of the present without compromising the ability of future generations to meet their own needs." This was introduced by:
(1) The Club of Rome
(2) The Intergovernmental Panel on Climate Change (IPCC)
(3) The Brundtland Commission
(4) The Kyoto Protocol
(5) Question not attempted

122. The Brundtland Commission, officially known as the World Commission on Environment and Development, published its seminal report in 1987 under the title:
(1) Our Common Future
(2) Silent Spring
(3) Limits to Growth
(4) Agenda 21
(5) Question not attempted

123. Read the following list of development dimensions:
I. Economic Development
II. Social Equity (Inclusion)
III. Environmental Protection
IV. Military Supremacy
Which combination constitutes the three core pillars (or dimensions) of sustainable development?
(1) I, II and III
(2) I, II and IV
(3) I, III and IV
(4) II, III and IV
(5) Question not attempted

124. "Agenda 21", a comprehensive plan of action to be taken globally, nationally, and locally in the area of sustainable development, was adopted at:
(1) Stockholm Conference, 1972
(2) Earth Summit (Rio de Janeiro), 1992
(3) World Summit on Sustainable Development (Johannesburg), 2002
(4) Rio+20 Conference, 2012
(5) Question not attempted

125. The principle of ensuring that current generations do not deplete resources in a way that leaves future generations impoverished is known as:
(1) Intragenerational equity
(2) The precautionary principle
(3) Intergenerational equity
(4) The polluter pays principle
(5) Question not attempted

126. Which of the following statements best reflects the concept of sustainable development?
(1) Halting all economic growth to preserve the environment completely untouched.
(2) Maximizing short-term economic gains

Click Here to Buy book on Amazon

amounts of clean electricity.
(3) They produce large amounts of fly ash and solid carbon waste.
(4) The water used in turbines becomes highly radioactive over time.
(5) Question not attempted

160. All of the following are considered renewable energy sources, EXCEPT:
(1) Geothermal energy
(2) Natural gas
(3) Tidal energy
(4) Small hydropower
(5) Question not attempted

161. How does the United Nations Environment Programme (UNEP) define a "Green Economy"?
(1) An economy that relies entirely on agricultural output and farming.
(2) An economy improving well-being and equity while reducing ecological risks.
(3) An economy where all industries are nationalized to protect environment.
(4) An economy that permits unlimited extraction if it generates currency.
(5) Question not attempted

162. The concept of "Green GDP" involves adjusting the traditional Gross Domestic Product by:
(1) Subtracting costs of environmental degradation and resource depletion.
(2) Adding the total profits of all national agricultural sectors.
(3) Multiplying GDP by a fixed 'green' multiplier from the UN.
(4) Ignoring industrial output and manufacturing entirely.
(5) Question not attempted

163. Identify the correct statement regarding a "Circular Economy."
(1) It follows a traditional linear 'take-make-dispose' industrial model.
(2) It encourages the production of single-use, non-recyclable products.
(3) Designing to minimize waste through continuous use, recycling, and regeneration.
(4) It refers to an economy that experiences cyclical periods of inflation.
(5) Question not attempted

164. Identify the incorrect statement regarding the transition to a Green Economy.
(1) It necessitates a shift towards renewable energy sources.
(2) It aims to decouple economic growth from resource depletion and environmental degradation.
(3) It creates opportunities for new employment, often referred to as "green jobs."
(4) It implies a complete halt to all industrial manufacturing and technological advancement.
(5) Question not attempted

NODIA

165. The concept of "decoupling" in the context of a green economy means:
(1) Separating environmental policies from economic policies completely.
(2) Removing environmental regulations to boost industrial output.
(3) Achieving growth without increasing environmental pressure and resource use.
(4) Breaking international trade agreements to focus on local ecology.
(5) Question not attempted

166. Read the following statements and select the correct option:
Statement I: Energy efficiency and eco-innovation are key drivers of a green economy.
Statement II: A green economy values natural capital, such as forests and wetlands, as critical economic assets.
(1) Statement I is correct, and Statement II is incorrect.
(2) Statement I is incorrect, and Statement II is correct.
(3) Both Statement I and Statement II are correct.
(4) Both Statement I and Statement II are incorrect.
(5) Question not attempted

167. The Partnership for Action on Green Economy (PAGE) is an initiative launched by:
(1) The World Bank
(2) The World Economic Forum
(3) The European Union
(4) A coalition of UN agencies (UNEP, ILO, UNDP, UNIDO, UNITAR)
(5) Question not attempted

STUDYING FROM PDFs?

THINK AGAIN.

If you are studying only from PDFs,
you are wasting valuable time.

Research shows that learning from

PRINTED BOOKS has up to

4× HIGHER RETENTION

than studying from screens.

PRINT BOOK = BETTER MEMORY

PDF = LOWER RETENTION

Those who study from **PRINTED BOOKS**
move **AHEAD.**

Others are left **BEHIND**
in competition.

In competitive exams,
being average is not enough.

STAY ONE STEP AHEAD.

Which combination explicitly focuses on environmental sustainability and natural resources?
(1) III, IV and V only
(2) I, III, IV and V only
(3) II, III, IV and V only
(4) I, II, III, IV and V
(5) Question not attempted

134. In India, which institution is primarily responsible for overseeing the implementation of the SDGs and releasing the SDG India Index?
(1) Ministry of Finance
(2) NITI Aayog
(3) Ministry of Environment, Forest and Climate Change
(4) Reserve Bank of India
(5) Question not attempted

135. Identify the correct pair of the Sustainable Development Goal and its subject:
(1) SDG 5 - Industry, Innovation and Infrastructure
(2) SDG 8 - Gender Equality
(3) SDG 16 - Life on Land
(4) SDG 11 - Sustainable Cities and Communities
(5) Question not attempted

136. Identify the incorrect pair regarding the SDGs:
(1) SDG 14 - Life on Land
(2) SDG 1 - No Poverty
(3) SDG 2 - Zero Hunger
(4) SDG 13 - Climate Action
(5) Question not attempted

137. Read the following statements and select the correct option:
Statement I: The SDGs replaced the Millennium Development Goals (MDGs) which ended in 2015.
Statement II: Unlike the MDGs, the SDGs are applicable only to developing nations.
(1) Statement I is correct, and Statement II is incorrect.
(2) Statement I is incorrect, and Statement II is correct.
(3) Both Statement I and Statement II are correct.
(4) Both Statement I and Statement II are incorrect.
(5) Question not attempted

138. Which term is most appropriately used by the UN to describe the period from 2020 to 2030 regarding the implementation of the SDGs?
(1) The Decade of Action
(2) The Decade of Recovery
(3) The Decade of Deliberation
(4) The Decade of Assessment
(5) Question not attempted

139. All of the following metrics are commonly used to measure a country's progress on SDGs, EXCEPT:
(1) Proportion of population living below the national poverty line
(2) Maternal mortality ratio
(3) Proportion of total land area covered by forests
(4) Total annual production of ozone-depleting substances for industrial expansion
(5) Question not attempted

140. Find the odd one out among the themes of the SDGs (focused on the "5 Ps" shaping the 2030 Agenda).
(1) People
(2) Profit
(3) Planet
(4) Prosperity
(5) Question not attempted

141. Natural Resource Management (NRM) primarily involves:
(1) Rapid extraction and sale of all natural resources to boost the national GDP.
(2) The complete privatization of all public forests and freshwater bodies.
(3) Managing interactions between people and landscapes to sustain natural resources.
(4) Prohibiting any form of human use of natural resources in all environments.
(5) Question not attempted

142. The National Forest Policy of 1988 set a target to bring what percentage of India's total geographical area under forest or tree cover?
(1) 20%
(2) 25%
(3) 40%
(4) 33%

Downloaded from www.pdf.tube

of 2006 further strengthened community conservation by recognizing the rights of forest-dwelling communities.
(1) Statement I is correct, and Statement II is incorrect.
(2) Statement I is incorrect, and Statement II is correct.
(3) Both Statement I and Statement II are correct.
(4) Both Statement I and Statement II are incorrect.
(5) Question not attempted

177. The National Forest Policy that explicitly formally recognized the need for people's involvement in forest conservation, leading to the JFM circular of 1990, was issued in:
(1) 1952
(2) 1988
(3) 1972
(4) 2006
(5) Question not attempted

178. A direct positive effect of successful Joint Forest Management in a region is usually:
(1) Regeneration of degraded forest cover and improved livelihood security for local communities
(2) Increased conflict between villagers and forest guards
(3) Rapid deforestation for agricultural expansion
(4) Complete elimination of all wildlife from the managed area
(5) Question not attempted

179. All of the following are challenges faced by Joint Forest Management, EXCEPT:
(1) Inadequate sharing of benefits leading to community disillusionment.
(2) Lack of legal backing and tenure security for the committees in some states.
(3) Over-abundance of funds preventing proper budget utilization.
(4) Conflicts between traditional rights and scientific forestry practices.
(5) Question not attempted

180. Find the odd one out regarding community conservation practices in India.
(1) Sacred Groves (Orans/Devrais)
(2) Bishnoi community's protection of Khejri and Blackbuck
(3) Joint Forest Management
(4) Commercial clear-cutting
(5) Question not attempted

181. Traditional Ecological Knowledge (TEK) can be best defined as:
(1) Ecological data collected exclusively via modern satellite imagery.
(2) Scientific research conducted by universities in the current century.
(3) Adaptive body of knowledge and beliefs about relationships between beings and environment.
(4) Legal frameworks designed by the UN to govern global biodiversity.
(5) Question not attempted

182. Which community in Rajasthan is world-renowned for their centuries-old tradition of protecting the environment, particularly the Khejri trees and Blackbucks, even sacrificing their lives for it (e.g., the Khejarli massacre)?
(1) Bhil
(2) Bishnoi
(3) Meena
(4) Garasia
(5) Question not attempted

183. Identify the correct statement regarding the role of Traditional Ecological Knowledge in modern conservation.
(1) Completely irrelevant to modern scientific conservation strategies.
(2) Limited only to mythological stories with no practical application.
(3) Advocates for the rapid exploitation of all natural resources.
(4) Valuable insights for climate adaptation and biodiversity conservation.
(5) Question not attempted

NODIA

184. Identify the incorrect statement regarding Traditional Ecological Knowledge (TEK).
(1) It is static and has not evolved or adapted over the centuries.
(2) It is deeply embedded in indigenous cultures and languages.
(3) It often utilizes holistic approaches to ecosystem management.

(2) Energy generated exclusively from the burning of fossil fuels.
(3) Energy that produces massive amounts of greenhouse gases and soot.
(4) Energy from natural sources replenished faster than they are consumed.
(5) Question not attempted

152. The headquarters of the International Solar Alliance (ISA), an initiative launched jointly by India and France, is located in:
(1) Gurugram, India
(2) Paris, France
(3) New Delhi, India
(4) Geneva, Switzerland
(5) Question not attempted

153. Identify the correct statement regarding wind energy in India.
(1) India has negligible wind energy potential due to its geographical location.
(2) Wind turbines can only generate electricity during the day.
(3) Tamil Nadu and Gujarat are among the leading states in wind power installation in India.
(4) Wind energy is highly polluting and contributes significantly to carbon emissions.
(5) Question not attempted

154. Identify the incorrect statement regarding biomass energy.
(1) Biomass energy is a non-renewable source because plants take millions of years to grow.
(2) It is derived from organic material such as plant and animal waste.
(3) Biogas is produced through the anaerobic digestion of organic matter.
(4) The use of biomass can help in waste management in rural areas.
(5) Question not attempted

155. While both generate electricity from sunlight, how does Solar Photovoltaic (PV) technology fundamentally differ from Concentrated Solar Power (CSP)?
(1) PV uses mirrors for heating fluid, while CSP uses semiconductors for light.
(2) PV works exclusively at night, while CSP only operates during the day.
(3) PV is for mechanical pumping, while CSP is strictly for heating water.
(4) PV uses semiconductors for electricity, while CSP uses mirrors and heat.
(5) Question not attempted

156. Read the following statements and select the correct option:
Statement I: The transition to renewable energy is essential for achieving the climate targets set under the Paris Agreement.
Statement II: Renewable energy sources currently provide 100% of India's total energy consumption.
(1) Statement I is correct, and Statement II is incorrect.
(2) Statement I is incorrect, and Statement II is correct.
(3) Both Statement I and Statement II are correct.
(4) Both Statement I and Statement II are incorrect.
(5) Question not attempted

157. Identify the correct pair regarding renewable energy installations in India.
(1) Kamuthi Solar Power Project - Gujarat
(2) Muppandal Wind Farm - Maharashtra
(3) Bhadla Solar Park - Rajasthan
(4) Charanka Solar Park - Tamil Nadu
(5) Question not attempted

158. Rajasthan possesses immense potential for solar energy generation primarily because:
(1) It has a massive network of perennial rivers for hydroelectricity.
(2) It has dense tropical forests that absorb sunlight very efficiently.
(3) It is located near the equator where sunlight is most intense globally.
(4) High solar radiation, clear sunny days, and vast wasteland availability.
(5) Question not attempted

159. Which is the most appropriate reason why large-scale hydroelectric projects are sometimes debated from a sustainability perspective?
(1) They cause forest submergence, community displacement, and ecosystem disruption.
(2) They do not generate any measurable

Click Here to Buy book on Amazon

regardless of ecological degradation.
(3) Substituting all natural resources with synthetic alternatives immediately.
(4) Balancing economic growth, social well-being, and environmental health.
(5) Question not attempted

127. Read the following statements and select the correct option:
Statement I: The Brundtland definition of sustainable development emphasizes the concept of 'needs', particularly the essential needs of the world's poor.
Statement II: It recognizes the idea of limitations imposed by the state of technology and social organization on the environment's ability to meet present and future needs.
(1) Statement I is correct, and Statement II is incorrect.
(2) Statement I is incorrect, and Statement II is correct.
(3) Both Statement I and Statement II are correct.
(4) Both Statement I and Statement II are incorrect.
(5) Question not attempted

128. Match the following international conferences/ reports in List I with their outcomes or significance in List II:
List I: (International Conference/Report)
A. Stockholm Conference (1972)
B. Brundtland Report (1987)
C. Rio Summit (1992)
D. Rio+20 (2012)
List II: (Outcome/Significance)
i. Coined the standard definition of Sustainable Development
ii. Adopted Agenda 21
iii. First major UN conference on the human environment (UNEP created)
iv. Focused on the "Green Economy" in the context of sustainable development
Options:
(1) A-iii, B-i, C-ii, D-iv
(2) A-i, B-ii, C-iii, D-iv
(3) A-iii, B-ii, C-i, D-iv
(4) A-ii, B-i, C-iv, D-iii
(5) Question not attempted

129. Identify the incorrect statement regarding sustainable development.
(1) It requires the integration of economic, social, and environmental policies.
(2) It encourages the overexploitation of non-renewable resources.
(3) It promotes the use of renewable energy sources.
(4) It advocates for sustainable consumption and production patterns.
(5) Question not attempted

130. All of the following are recognized principles underlying sustainable development, EXCEPT:
(1) Principle of limitless consumption
(2) Integration principle
(3) Precautionary principle
(4) Polluter pays principle
(5) Question not attempted

131. The 2030 Agenda for Sustainable Development, adopted by all UN Member States in 2015, provides a shared blueprint consisting of how many Sustainable Development Goals (SDGs)?
(1) 8
(2) 15
(3) 17
(4) 21
(5) Question not attempted

132. Arrange the following Sustainable Development Goals in correct numerical order from SDG 1 to SDG 4:
I. Quality Education
II. No Poverty
III. Zero Hunger
IV. Good Health and Well-being
Which of the following represents the correct sequence?
(1) II, III, IV, I
(2) II, IV, III, I
(3) III, II, IV, I
(4) I, II, III, IV
(5) Question not attempted

133. Read the following list of SDGs:
I. SDG 6 (Clean Water and Sanitation)
II. SDG 7 (Affordable and Clean Energy)
III. SDG 13 (Climate Action)
IV. SDG 14 (Life Below Water)
V. SDG 15 (Life on Land)

NODIA

168. A major positive effect of a government shifting its investments from fossil fuels to public transportation and renewable energy infrastructure is:
(1) The creation of "green jobs" and stimulation of sustainable economic growth.
(2) An increase in national carbon emissions.
(3) The rapid depletion of foreign exchange reserves without any return.
(4) A decrease in technological innovation.
(5) Question not attempted

169. All of the following are mechanisms to promote a green economy, EXCEPT:
(1) Implementing carbon pricing or carbon taxes
(2) Issuing Green Bonds to finance sustainable projects
(3) Providing massive subsidies for fossil fuel extraction
(4) Promoting Extended Producer Responsibility (EPR) regulations
(5) Question not attempted

170. Find the odd one out in terms of economic models related to sustainability.
(1) Linear Economy
(2) Circular Economy
(3) Green Economy
(4) Blue Economy (sustainable use of ocean resources)
(5) Question not attempted

171. Joint Forest Management (JFM) is a concept that involves:
(1) The joint ownership of forests by two different state governments.
(2) The privatization of forest lands to joint-stock companies.
(3) International management of border forests by the United Nations.
(4) Partnership between communities and forest departments for management.
(5) Question not attempted

172. The first successful experiment of Joint Forest Management in India, which later served as a model, took place in the Arabari forest range located in which state?
(1) Madhya Pradesh
(2) West Bengal
(3) Rajasthan
(4) Uttarakhand
(5) Question not attempted

NODIA

173. Identify the correct statement regarding the institutional framework of Joint Forest Management.
(1) Committees composed exclusively of forest department officials.
(2) Removing the legal ownership of the state over forest land.
(3) Forming village institutions like Forest Protection Committees.
(4) Applicability only to pristine, highly dense national parks.
(5) Question not attempted

174. Identify the incorrect statement regarding benefit-sharing in JFM.
(1) Local communities are granted rights to collect non-timber forest produce (NTFPs).
(2) Communities get a share in the revenue generated from the final harvesting of timber.
(3) The communities receive these benefits in exchange for their role in protecting the forest from fires, grazing, and illegal felling.
(4) The entire revenue from timber sales goes exclusively to the Central Government.
(5) Question not attempted

175. Sacred groves are a classic example of community-based conservation. They are best described as:
(1) Forest tracts protected by communities due to religious and cultural beliefs.
(2) Government-owned timber plantations for industrial development.
(3) Areas designated for commercial eco-tourism by private resorts.
(4) Scientific botanical gardens created by experts in urban areas.
(5) Question not attempted

176. Read the following statements and select the correct option:
Statement I: Community-based conservation relies on the premise that local people are the best stewards of natural resources if their livelihoods are linked to conservation.
Statement II: The Forest Rights Act (FRA)

(2) The Kyoto Protocol (1997)
(3) The Stockholm Convention (2001)
(4) The Minamata Convention (2013)
(5) Question not attempted

193. Identify the correct statement regarding a "Cap and Trade" mechanism.
(1) Banning all carbon emissions immediately with no trade allowed.
(2) Setting emission limits and allowing trade of surplus allowances.
(3) Allowing unlimited emissions if a fixed tax per tonne is paid.
(4) Voluntary schemes for planting trees without emission limits.
(5) Question not attempted

194. Identify the incorrect statement comparing Carbon Tax and Emissions Trading.
(1) Under an emissions trading system, companies are never allowed to buy credits from the market; they must reduce emissions internally to zero.
(2) A carbon tax sets a fixed price on carbon emissions but does not guarantee a specific limit on total emissions.
(3) An emissions trading system (cap and trade) guarantees a specific limit on total emissions but allows the price of carbon to fluctuate based on the market.
(4) Both mechanisms aim to internalize the environmental cost of carbon emissions to reduce greenhouse gases.
(5) Question not attempted

195. In carbon offset projects, the principle of "Additionality" means:
(1) The project must produce additional products besides carbon reduction.
(2) The project must be located in at least two additional countries.
(3) Reductions must be real and not possible without carbon credit revenue.
(4) The company must hire additional staff to monitor emissions.
(5) Question not attempted

196. Read the following statements and select the correct option:
Statement I: The Clean Development Mechanism (CDM) under the Kyoto Protocol allowed developed countries to invest in emission-reduction projects in developing countries to earn carbon credits.
Statement II: Developing countries like India were not eligible to participate in or benefit from CDM projects.
(1) Statement I is correct, and Statement II is incorrect.
(2) Statement I is incorrect, and Statement II is correct.
(3) Both Statement I and Statement II are correct.
(4) Both Statement I and Statement II are incorrect.
(5) Question not attempted

197. One carbon credit is universally accepted as equivalent to the reduction, avoidance, or sequestration of:
(1) 1 kilogram of carbon dioxide gas emitted.
(2) 100 kilograms of carbon dioxide gas emitted.
(3) 1 metric tonne of carbon dioxide or equivalent gases.
(4) 10 metric tonnes of carbon dioxide emitted.
(5) Question not attempted

198. "Carbon Leakage" is a phenomenon that occurs when:
(1) Carbon dioxide physically leaking from underground storage facilities.
(2) Industries relocating to countries with weak regulations due to local policy.
(3) Trees releasing carbon dioxide during the night instead of oxygen.
(4) Carbon credits being sold twice in the market due to tracking error.
(5) Question not attempted

199. All of the following are typically valid methods for generating carbon credits, EXCEPT:
(1) Developing large-scale wind or solar power projects that replace fossil fuel dependency.
(2) Afforestation and reforestation projects that sequester carbon.
(3) Capturing methane from landfills to generate electricity.
(4) Increasing the production of single-use plastics to reduce timber use.
(5) Question not attempted

Downloaded from www.pdf.tube

(4) Nagoya Protocol recognizes the importance of TEK and mandates fair benefit-sharing for its use.
(5) Question not attempted

185. Traditional water harvesting structures in Rajasthan, such as Johads, Bawaris, and Tankas, represent the application of TEK primarily for:
(1) Generating hydroelectricity for industrial expansion.
(2) Enhancing soil erosion for geological research.
(3) Capturing and storing rainwater for security in desert ecosystems.
(4) Discharging industrial effluents safely into soil.
(5) Question not attempted

186. Read the following statements and select the correct option:
Statement I: The Biological Diversity Act of 2002 mandates the documentation of traditional ecological knowledge through People's Biodiversity Registers (PBRs).
Statement II: PBRs are prepared at the local level by Biodiversity Management Committees to protect TEK from biopiracy.
(1) Statement I is correct, and Statement II is incorrect.
(2) Statement I is incorrect, and Statement II is correct.
(3) Both Statement I and Statement II are correct.
(4) Both Statement I and Statement II are incorrect.
(5) Question not attempted

187. The Traditional Knowledge Digital Library (TKDL) is an Indian initiative aimed primarily at:
(1) Digitizing modern scientific journals for free public access.
(2) Creating a database of all wild animals in Indian zoos.
(3) Replacing traditional healers with modern doctors in rural areas.
(4) Preventing invalid international patents on traditional knowledge.
(5) Question not attempted

188. What is the effect of integrating TEK with modern scientific forestry?
(1) It usually results in the complete destruction of the forest ecosystem.
(2) It leads to better, more sustainable co-management strategies that are socially acceptable and ecologically sound.
(3) It causes immediate legal disputes leading to the abolishment of forest laws.
(4) It forces local communities to migrate to urban centers.
(5) Question not attempted

189. All of the following are examples of Traditional Ecological Knowledge applied in India, EXCEPT:
(1) Zabo system of water management in Nagaland
(2) Bamboo drip irrigation in Meghalaya
(3) Large-scale genetically modified crop cultivation using synthetic fertilizers
(4) Protection of 'Orans' (sacred groves) in Rajasthan
(5) Question not attempted

190. Identify the correct pair connecting a traditional practice/system with its region.
(1) Apatani system (Wet rice cultivation) - Rajasthan
(2) Johad (Rainwater harvesting) - Northeast India
(3) Khadin (Runoff farming) - Jaisalmer
(4) Surangam (Traditional water management) - Kerala
(5) Question not attempted

191. A "Carbon Credit" is best defined as:
(1) A tradable permit to emit one tonne of carbon dioxide or equivalent gas.
(2) A tax levied on companies that emit excessive greenhouse gases.
(3) A loan given by the World Bank for large-scale tree planting.
(4) A penalty imposed on citizens for using fossil-fuel vehicles.
(5) Question not attempted

192. The concept of carbon credits and emissions trading was formally internationalized under which historic environmental treaty?
(1) The Montreal Protocol (1987)

NODIA

(5) Question not attempted

143. Identify the correct statement regarding groundwater management in India.
(1) The CGWA regulates and controls groundwater development and management.
(2) India remains one of the lowest extractors of groundwater globally.
(3) Groundwater is an inexhaustible resource that requires no recharge.
(4) Agricultural irrigation accounts for less than 10% of groundwater use.
(5) Question not attempted

144. Identify the incorrect statement regarding sustainable mineral management.
(1) It involves minimizing environmental degradation during extraction.
(2) It encourages illegal and unregulated mining for rapid economic growth.
(3) It promotes the recycling of metals to reduce virgin ore extraction.
(4) It requires comprehensive mine closure plans and ecological restoration of mined-out areas.
(5) Question not attempted

145. Watershed management is a holistic approach applied primarily for the sustainable management of which natural resources?
(1) Deep-sea minerals
(2) Soil and water in a defined drainage basin
(3) Coal and petroleum reserves
(4) Urban airspace
(5) Question not attempted

146. Read the following statements and select the correct option:
Statement I: Afforestation and reforestation are key strategies in forest resource management to combat desertification.
Statement II: Monoculture plantations offer the same level of biodiversity and ecological resilience as natural, multi-species forests.
(1) Statement I is correct, and Statement II is incorrect.
(2) Statement I is incorrect, and Statement II is correct.
(3) Both Statement I and Statement II are correct.
(4) Both Statement I and Statement II are incorrect.
(5) Question not attempted

147. All of the following are consequences of poor water resource management, EXCEPT:
(1) Depletion of aquifers
(2) Saltwater intrusion in coastal areas
(3) Increase in groundwater tables in over-exploited blocks
(4) Deterioration of water quality due to pollution
(5) Question not attempted

148. The CAMPA (Compensatory Afforestation Fund Management and Planning Authority) funds are primarily utilized for:
(1) Compensating farmers for crop losses due to extreme droughts.
(2) Subsidizing mining operations located in dense forests.
(3) Constructing large multi-purpose river dams and bridges.
(4) Afforestation and regeneration to compensate for diverted forest land.
(5) Question not attempted

149. Unregulated deforestation in hilly regions directly leads to which of the following effects?
(1) Significant increase in the rate of groundwater recharge.
(2) Considerable decrease in the rate of soil erosion.
(3) Greater frequency and severity of landslides and flash floods.
(4) Substantial expansion of various native wildlife habitats.
(5) Question not attempted

150. Find the odd one out among natural resources based on renewability.
(1) Solar energy
(2) Coal
(3) Groundwater (if sustainably managed)
(4) Forests (if sustainably harvested)
(5) Question not attempted

151. Which of the following best defines renewable energy?
(1) Energy derived from various resources that are depleted by use.

Click Here to Buy book on Amazon

200. Which of the following is the most appropriate distinction between compliance carbon markets and voluntary carbon markets?

(1) Compliance markets are mandatory; voluntary markets are for non-mandatory offsets.
(2) Compliance markets for individuals, whereas voluntary markets for corporations.
(3) Compliance markets for methane, while voluntary markets for carbon dioxide.
(4) There is no difference; they are terms for the same system managed by the UN.
(5) Question not attempted

www.nodia.in

NODIA

India is legally obligated to implement domestic measures that regulate and monitor international trade in endangered species. This amendment ensures that national law is fully aligned with global conservation standards and trade regulations.

37. (3) National Green Tribunal
The National Board for Wildlife, Central Zoo Authority, and National Tiger Conservation Authority are all statutory bodies established under the provisions of the Wildlife Protection Act, 1972. The National Green Tribunal, however, was established under a separate act in 2010 to handle environmental disputes. Therefore, it is the only entity in the list not constituted under the original 1972 Act.

38. (2) Central Government can declare specific non-Schedule I/II species as vermin by notification.
The 2022 amendment removed the separate schedule for vermin but retained a mechanism for managing problematic species. The Central Government now has the power to issue notifications declaring specific species, other than those in Schedules I and II, as vermin for a limited period in a specific area. This allows for controlled management of species that cause damage to agricultural crops.

39. (4) Schedule V
Before the recent amendments in 2022, the Wildlife Protection Act of 1972 categorized wild animals into six schedules. Schedule V was specifically dedicated to "Vermin," which included species like common crows, fruit bats, mice, and rats. Animals listed in this schedule could be hunted without a license, as they were not afforded the same level of high legal protection.

40. (1) It is chaired by the Prime Minister of India.
The National Board for Wildlife is a statutory body constituted under the Wildlife Protection Act of 1972. It serves as the apex body for all wildlife-related matters in India and is chaired by the Prime Minister. The board's functions include reviewing all wildlife-related projects and making recommendations on the boundaries of National Parks and Sanctuaries across the entire country.

41. (3) 1973
Project Tiger was officially launched by the Government of India on April 1, 1973. This ambitious conservation program was initiated to ensure a viable population of Bengal tigers in their natural habitats. It aimed to protect tigers from extinction and preserve areas of biological importance as a national heritage, marking a significant milestone in India's wildlife conservation history and efforts.

42. (4) I, II, III and IV
When Project Tiger was launched in 1973, it began with the designation of nine initial tiger reserves. These original reserves included Bandipur in Karnataka, Jim Corbett in Uttarakhand, Kanha in Madhya Pradesh, and Manas in Assam. These areas were selected to represent different ecosystems and were given special protection to facilitate the recovery and growth of the national tiger population.

43. (4) National Tiger Conservation Authority (NTCA)
The National Tiger Conservation Authority was established in 2005 following the recommendations of the Tiger Task Force. It was given statutory status through the 2006 amendment of the Wildlife Protection Act. The NTCA provides administrative and political leadership to Project Tiger, ensuring that tiger reserves are managed according to standardized guidelines and that conservation efforts are strengthened across India.

44. (2) Tiger census in India is conducted annually across all reserves.
Tiger estimation in India is a massive undertaking conducted every four years, not annually. While early methods relied on pugmarks, modern census techniques integrate camera trapping, DNA analysis, and digital tools like the M-STrIPES application. This quadrennial cycle allows for a comprehensive assessment of tiger populations, their prey base, and habitat status across the entire national network of tiger reserves.

45. (1) A-ii, B-i, C-iv, D-iii
Tiger reserves in India are located across various states with unique ecological profiles. Dampa Tiger Reserve is situated in Mizoram, while Pakke Tiger Reserve is in Arunachal Pradesh.

Downloaded from www.pdf.tube

9. (3) An ecosystem with highly uneven species distribution is stable.
Species diversity involves richness, the total number of species, and evenness, the relative abundance of each species. Ecosystem stability generally increases with higher diversity and evenness. A community dominated by only a few species is typically more vulnerable to disturbances. Therefore, claiming that highly uneven species distribution leads to ecosystem stability is ecologically incorrect and contradicts standard biological principles.

10. (1) Beta diversity
Beta diversity measures the rate of change in species composition between different habitats or ecosystems. When adjacent forest patches contain entirely different sets of bird species, the species turnover is considered very high. This comparison helps scientists determine the uniqueness of individual sites and the degree of differentiation across a broader landscape or environmental gradient within a larger geographical region.

11. (4) Norman Myers
The concept of biodiversity hotspots was originally developed by environmental scientist Norman Myers in 1988. This framework identifies geographical regions that are both rich in endemic species and facing significant threats from habitat loss. His work provided a crucial tool for prioritizing global conservation efforts by focusing on areas with the highest potential for extinction and unique biological wealth.

12. (2) The Vindhyan Range
India is home to four globally recognized biodiversity hotspots: the Himalayas, the Western Ghats, Indo-Burma, and Sundaland. These regions are identified by their exceptional levels of endemism and severe habitat loss. While the Vindhyan Range is ecologically important, it does not meet the specific international criteria required to be classified as a global biodiversity hotspot under standard scientific assessments.

13. (1) I and II only
To qualify as a biodiversity hotspot, a region must harbor at least 1,500 endemic vascular plant species and have lost seventy percent of its original native vegetation. Hotspots are defined by high endemism and high threat levels rather than specific latitudes or the presence of megafauna. Consequently, only the botanical and habitat loss criteria are valid in this specific context.

14. (4) Odisha
The Western Ghats biodiversity hotspot runs along the western coast of India, spanning across Gujarat, Maharashtra, Goa, Karnataka, Tamil Nadu, and Kerala. This mountain range is famous for its unique flora and fauna. Odisha is located on the eastern coast of the Indian peninsula and is not part of the Western Ghats mountain system or its designated ecological hotspot.

15. (1) Both A and R are true and R is the correct explanation of A.
The Western Ghats are a globally recognized biodiversity hotspot because they contain a vast number of species found nowhere else on Earth. This high degree of endemism, coupled with significant environmental threats from human activities, fulfills the essential criteria for hotspot designation. Thus, the reasoning provided accurately explains why this region is classified under this specific international conservation category.

NODIA

16. (2) Sundaland
The Nicobar Islands are geologically and biologically linked to the Southeast Asian archipelago, placing them within the Sundaland biodiversity hotspot. This region includes the Malay Peninsula and various Indonesian islands. While the Andaman Islands are often associated with the Indo-Burma hotspot, the Nicobars represent India's contribution to the extremely rich and threatened Sundaland ecological zone in the Indian Ocean.

17. (2) Sundaland Hotspot - Lakshadweep Islands
The Sundaland hotspot in India primarily includes the Nicobar Islands, while the Indo-Burma hotspot covers the northeastern states. The Himalayas hotspot encompasses the mountain range in Arunachal Pradesh. However, the Lakshadweep Islands are coral atolls in the Arabian Sea and are not classified as part of the Sundaland hotspot, making this specific pairing incorrect and factually inaccurate.

18. (3) Both Statement I and Statement II are correct.
Endemic species are restricted to a specific geographical area and are not naturally found elsewhere. High endemism is one of the two mandatory criteria used to identify global biodiversity hotspots. Therefore, both statements accurately describe the nature of endemism and its fundamental role in determining which regions of the world require urgent and prioritized conservation attention from environmental agencies.

19. (3) A region with high species richness, endemism, and threat of destruction.
Biodiversity hotspots are biogeographic regions that serve as significant reservoirs of biodiversity. They are defined by the presence of a vast number of endemic species and the fact that the natural habitat is under extreme threat from human exploitation. These areas are prioritized for conservation because they represent the most biologically rich yet most endangered ecosystems on the planet today.

20. (4) Accelerated rate of local and global species extinction.
Habitat destruction in biodiversity hotspots is particularly devastating because these areas contain endemic species that exist nowhere else. When their unique habitats are lost, these species face immediate extinction. Consequently, the degradation of these critical regions leads directly to an accelerated loss of global biodiversity, as the specialized life forms they support cannot survive in significantly altered environments.

21. (3) 1948
The International Union for Conservation of Nature was established in October 1948 in Fontainebleau, France. It was the world's first global environmental organization and currently serves as the leading authority on the status of the natural world. Since its inception, the organization has worked to influence, encourage, and assist societies throughout the world to conserve biodiversity and ensure sustainable use.

22. (1) II, I, IV, III
The IUCN Red List categorizes species based on their proximity to extinction. Vulnerable species face a high risk of extinction in the medium term. Endangered species face a very high risk in the near future. Critically Endangered species face an extremely high risk immediately. Extinct in the Wild represents the highest risk level, as no living individuals remain outside captivity.

23. (4) I, II, III, IV and V
A species is classified as Critically Endangered if it meets any of several quantitative criteria. These include a population reduction of ninety percent over ten years, a range smaller than one hundred square kilometers, a population of fewer than fifty mature individuals, or a fifty percent probability of extinction within a decade. Each of these parameters indicates an extremely high risk.

24. (1) Extinct in the Wild
A taxon is categorized as Extinct in the Wild when it is known only to survive in cultivation, in captivity, or as a naturalized population well outside its past range. Since the frog species has not been observed in its natural environment for sixty years but still persists in a research terrarium, it fits this specific conservation status precisely and accurately.

25. (3) Pygmy Hog - Critically Endangered
The Pygmy Hog is the world's smallest and rarest wild suid and is listed as Critically Endangered due to its extremely small and fragmented population. In contrast, the Great Indian Bustard is also Critically Endangered, and the Snow Leopard is Vulnerable. The Olive Ridley Turtle is Vulnerable, and no major Indian megafauna species are currently classified as Extinct.

26. (1) A-iii, B-iv, C-i, D-ii
Extinct status confirms that the last individual of a species has died. Data Deficient indicates insufficient information to assess extinction risk accurately. Near Threatened identifies taxa likely to qualify for a threatened category soon. Least Concern applies to widespread and abundant species. This mapping ensures that each IUCN Red List category is linked with its standardized global scientific description.

27. (3) Faces a high risk of extinction in the wild in the medium-term future.
According to the IUCN Red List criteria, a taxon is categorized as Vulnerable when the best available evidence indicates that it meets specific

Click Here to Buy book on Amazon

thresholds for population size or range decline. This classification signifies that the species is facing a high risk of extinction in the wild in the medium-term future, requiring conservation attention to prevent further status deterioration.

28. (2) It relies solely on qualitative data and ignores quantitative criteria like population reduction.
The IUCN Red List is a scientifically rigorous system that relies heavily on quantitative criteria. These include measurable data on population size reduction, geographic range size, and probability of extinction. It does not rely solely on qualitative descriptions. Species in the Vulnerable, Endangered, and Critically Endangered categories are collectively identified as Threatened, and the list informs global conservation policies.

29. (3) The Red Data Book
The Red Data Book is the state document established for documenting rare and endangered species of animals, plants, and fungi. Maintained by the IUCN, it provides comprehensive data on the conservation status of various taxa across the globe. This publication is essential for tracking biodiversity loss and guiding international efforts to protect species that are at risk of extinction.

30. (4) Ecological Exception
The official IUCN Red List categories include Extinct, Extinct in the Wild, Critically Endangered, Endangered, Vulnerable, Near Threatened, Least Concern, Data Deficient, and Not Evaluated. These categories provide a standardized framework for assessing the risk of extinction. Ecological Exception is not a recognized term or category within this global system used to evaluate the status of biological species.

31. (1) Four
The Wildlife Protection Amendment Act of 2022 significantly rationalized the structure of the original 1972 Act. It reduced the total number of schedules from six to four. These updated schedules now cover animal species with high protection, species with lesser protection, protected plants, and a dedicated new schedule for species listed under the CITES appendices for international trade.

32. (2) It allows for the completely unregulated hunting of Schedule I animals for sports.
The Wildlife Protection Act of 1972 provides a comprehensive legal framework for establishing protected areas and prohibiting trade in wildlife. Crucially, it strictly forbids the hunting of animals listed in the schedules, especially those in Schedule I, which receive the highest protection. Sport hunting is not permitted under the Act, making the claim of unregulated hunting entirely incorrect.

33. (1) A-ii, B-i, C-iv, D-iii
Following the 2022 amendment, Schedule I of the Wildlife Protection Act includes species requiring the highest level of protection. Schedule II covers those requiring lesser protection. Schedule III is dedicated to protected plant species. Schedule IV is a new addition specifically for specimens listed in the Appendices of CITES. This revised structure streamlines the legal protection levels for India's biodiversity.

34. (1) Statement I is correct, and Statement II is incorrect.
Under the Wildlife Protection Act of 1972, State Governments have the primary power to declare specific areas as Sanctuaries or National Parks. However, the Central Government also retains the authority to declare such protected areas under certain circumstances, particularly when the land is under its control. Thus, the claim that the Centre cannot declare these areas is factually incorrect.

35. (3) The Chief Wildlife Warden
The Chief Wildlife Warden is the statutory authority appointed by the State Government under the Wildlife Protection Act of 1972. This official is responsible for the direct management and control of wildlife within the state. Their duties include granting permissions for research, managing protected areas, and addressing issues related to wildlife conservation and human-animal conflict at the state level.

36. (1) Both A and R are true and R is the correct explanation of A.
The 2022 amendment to the Wildlife Protection Act introduced a new schedule specifically to accommodate species listed under CITES. As a signatory to this international convention,

Downloaded from www.pdf.tube

ANSWERS

1. (2) The variation of genes and alleles within a single species
Genetic diversity encompasses the total variety of genetic information contained within the individuals of a single species. It refers specifically to the variation of genes and alleles across populations. This diversity is crucial for the survival and adaptation of species to changing environments and forms a fundamental level of biological variety that ensures long-term reproductive health.

2. (1) Alpha diversity
Alpha diversity represents the species richness within a particular area or specific ecosystem. It measures the number of species found in a localized habitat. This metric helps ecologists understand the internal complexity of a community. It is distinct from beta and gamma diversity, which compare different habitats or cover much larger geographical regions to assess biodiversity on broader scales.

3. (1) I and II only
Genetic diversity is essential for the adaptation of species to environmental shifts. Ecosystem diversity describes the variety of habitats and ecological processes. However, species diversity is not uniformly distributed across the globe. It generally increases toward the equator and decreases toward the poles. Therefore, only the observations concerning genetics and ecosystems are scientifically accurate in the context of biodiversity levels.

4. (4) The variety of deserts, rainforests, mangroves, and coral reefs
India exhibits significant ecosystem diversity due to its varied geographical and climatic conditions. This level of biodiversity is characterized by the presence of distinct ecological systems like deserts, tropical rainforests, mangroves, and coral reefs. These ecosystems support diverse communities and ecological processes, representing a much higher level of complexity than species-level or genetic-level variations observed within single biological populations.

5. (3) Species diversity generally decreases as one moves from the equator towards the poles.
Latitudinal gradients show that species diversity is highest in the tropics and gradually declines toward higher latitudes. The equatorial regions provide stable climates and high productivity, supporting a greater variety of life. Conversely, the harsh conditions and shorter growing seasons near the poles lead to a significant decrease in the total number of species found in those specific polar ecosystems.

6. (2) The Amazon rainforest
The Amazon rainforest is frequently described as the lungs of the planet because of its immense capacity for oxygen production and carbon sequestration. Located in South America, it harbors an unparalleled richness of species. This vast tropical ecosystem plays a critical role in regulating global climate patterns and maintaining the atmospheric balance of gases essential for the survival of life.

7. (4) Biome diversity
Alpha, beta, and gamma diversity are standard metrics established by ecologists to measure biodiversity at different spatial scales within a landscape. Alpha refers to local diversity, beta to species turnover between areas, and gamma to regional richness. Biome diversity is not a standard taxonomic or ecological measurement level used in this specific comparative framework for assessing biodiversity within regions.

8. (1) A-ii, B-iv, C-i, D-iii
Alpha diversity identifies the number of species within a specific local area. Beta diversity evaluates the change in species composition along environmental gradients. Gamma diversity reflects the total biodiversity across a large regional landscape. Genetic diversity focuses on the variation of alleles within a population, ensuring that each concept is correctly mapped to its standardized ecological and biological definition.

NODIA

Satkosia Tiger Reserve is found in Odisha, and Pilibhit Tiger Reserve is located in Uttar Pradesh. Correctly identifying these locations is essential for understanding the geographic distribution of tiger conservation efforts today.

46. (4) Strictly protected core areas with no human activity and buffers allowing local co-existence.
The core-buffer strategy is the foundation of tiger reserve management. The core zone is a strictly protected area where no human activity or resource extraction is permitted to ensure undisturbed habitats. The surrounding buffer zone allows for a degree of human-wildlife co-existence, facilitating regulated activities like eco-tourism and limited resource use while protecting the absolute integrity of the core habitat.

47. (1) II, I, IV, III
Moving from North to South, Jim Corbett National Park in Uttarakhand is the northernmost. It is followed by Bandhavgarh Tiger Reserve in Madhya Pradesh. Further south is Pench Tiger Reserve, which spans the border of Madhya Pradesh and Maharashtra. Periyar Tiger Reserve in Kerala is the southernmost in this sequence, reflecting the latitudinal distribution of these critical protected areas in India.

48. (2) Tal Chhapar
Rajasthan has several designated tiger reserves, including Ranthambore, Sariska, and Mukundra Hills. These areas are specifically managed under Project Tiger to protect the Bengal tiger. Tal Chhapar, however, is a wildlife sanctuary primarily famous for its population of blackbucks and migratory birds. It is not a notified tiger reserve, making it the odd one out in this specific context.

49. (2) Establishment of NTCA - Wildlife Protection Amendment Act 2006
The National Tiger Conservation Authority was formally established through the Wildlife Protection Amendment Act of 2006 to provide statutory backing to Project Tiger. Other milestones include the St. Petersburg Declaration, which aimed to double the global tiger population by 2022. International Tiger Day is celebrated on July 29, not August 12, which is specifically dedicated to the conservation of elephants.

50. (1) National Tiger Conservation Authority
Under the Wildlife Protection Act, any proposal for an activity that impacts a tiger reserve, particularly the core zone, requires the explicit recommendation of the National Tiger Conservation Authority. The NTCA ensures that such projects do not compromise the integrity of the habitat. This statutory requirement provides a critical layer of protection against infrastructure development that could fragment essential wildlife corridors.

51. (3) 1992
Project Elephant was launched by the Ministry of Environment and Forests in February 1992. This centrally sponsored scheme was initiated to provide financial and technical support to major elephant-bearing states. Its primary goal is to ensure the long-term survival of viable populations of Asian elephants in their natural habitats throughout the various ecological regions of the diverse Indian subcontinent.

52. (1) I, II and III only
Project Elephant focuses on three main objectives: protecting elephants and their habitats, addressing the rising challenges of human-elephant conflict, and ensuring the welfare of captive elephants. It does not promote ivory trade, which is strictly illegal, nor does it aim to relocate all wild elephants to zoos. The project emphasizes in-situ conservation and the maintenance of essential migratory corridors.

53. (3) Monitoring the Illegal Killing of Elephants
The MIKE programme is an international initiative established by CITES to monitor the illegal killing of elephants. It aims to provide information needed for elephant range states to make appropriate management and enforcement decisions. By tracking trends in illegal killing, the program helps assess the impact of CITES decisions and identifies the factors contributing to poaching in various regions.

54. (1) Both A and R are true and R is the correct explanation of A.
Elephant corridors are vital land strips that connect larger forest patches, allowing these mega-herbivores to move freely. Because elephants require vast foraging ranges, corridors prevent the genetic isolation of populations and

Click Here to Buy book on Amazon

significantly reduce human-elephant conflict by steering herds away from human settlements. Thus, protecting these pathways is fundamentally essential for the long-term survival and health of the Asian elephant.

55. (1) A-ii, B-i, C-iv, D-iii
Elephant reserves are designated to protect the habitats and migratory paths of elephants. Lemru Elephant Reserve is located in Chhattisgarh, while the Shivalik Elephant Reserve is in Uttarakhand. The Nilgiri Elephant Reserve spans parts of Tamil Nadu and neighboring states. Singhbhum, India's first elephant reserve, is situated in Jharkhand. Correct geographic mapping is crucial for managing these large-scale habitats.

56. (3) Both Statement I and Statement II are correct.
Asian elephants are currently listed as Endangered on the IUCN Red List due to population declines and habitat loss. African elephants, though also threatened, have significantly larger global populations compared to their Asian relatives. Both statements accurately reflect the current conservation status and relative abundance of these two distinct species, highlighting the urgent need for global protection and habitat restoration efforts.

57. (3) Indigenous communities are legally permitted to trade elephant ivory under the WPA 1972.
In India, the Asian elephant is recognized as the National Heritage Animal. Karnataka holds the largest population of these animals. Project Elephant provides support to states for conservation. Crucially, the trade of ivory is completely banned under the Wildlife Protection Act, 1972, for all individuals and communities. Claiming that ivory trade is legally permitted is factually incorrect and highly misleading.

58. (1) Narrow land strips connecting larger habitats to allow safe elephant movement between them.
An elephant corridor is a narrow strip of land that acts as a bridge between two larger forested habitats. These corridors are essential for the movement of elephants as they migrate between areas in search of food and water. By facilitating safe passage, these strips help maintain genetic flow between populations and minimize the chances of elephants entering human-occupied landscapes.

59. (4) Massive overpopulation caused by the high reproductive rate of elephants.
Human-elephant conflict in India is primarily driven by habitat fragmentation, encroachment for agriculture, and linear infrastructure like railways. These factors force elephants out of forests into human settlements. However, elephants have a low reproductive rate and long gestation periods, so overpopulation is not a cause. The conflict arises from the loss of space, not an explosion in elephant numbers.

NODIA

60. (2) Rising incidents of human-elephant conflicts and crop raiding.
The deployment of early warning systems and solar-powered electric fences near forests is a direct response to the increasing frequency of human-elephant conflicts. These measures are designed to detect elephant movements and prevent them from entering agricultural fields. By deterring elephants from raiding crops and entering villages, these technologies help protect human lives and livelihoods while reducing retaliatory killings.

61. (3) 2009
Project Snow Leopard was launched by the Government of India in January 2009. This initiative was designed to safeguard the snow leopard and its high-altitude habitat in the Himalayan region. It emphasizes a participatory approach involving local communities in conservation efforts, reflecting the unique ecological and social challenges of protecting this elusive predator across the vast and rugged mountain landscapes.

62. (4) I, II and III
The snow leopard is found in the high-altitude alpine and subalpine zones of the Himalayas. In India, its natural habitat spans across Jammu & Kashmir, Ladakh, Himachal Pradesh, Uttarakhand, Sikkim, and Arunachal Pradesh. These regions provide the rugged terrain and prey species, such as bharal and ibex, that are essential for the survival of this specialized mountain predator across the north.

63. (1) I, II and IV only
The Gangetic Dolphin is essentially blind and uses echolocation to navigate freshwater systems. It was declared India's National Aquatic

Animal in 2009. While it is highly threatened, it is currently classified as Endangered by the IUCN, not Critically Endangered. This species is found in the Ganges-Brahmaputra-Meghna river systems, making it a vital indicator of river health and biodiversity.

64. (2) It focuses on both riverine and marine dolphins and involves community participation.
Project Dolphin was initiated to conserve both freshwater river dolphins and marine dolphins in India's coastal waters. This project utilizes modern technology for monitoring and emphasizes the involvement of local fishing communities in protection efforts. By addressing the threats in both ecosystems, the project aims to improve the status of these aquatic mammals and the overall health of their diverse habitats.

65. (2) Bihar
The Vikramshila Gangetic Dolphin Sanctuary is located in the Bhagalpur district of Bihar. It is the only protected area in India specifically designated for the conservation of the Gangetic dolphin. Established to protect a significant stretch of the Ganges River, the sanctuary provides a safe haven for this endangered species and supports research into its behavior and critical ecological requirements.

66. (1) A-iii, B-ii, C-i, D-iv
The Gangetic Dolphin is found in the Brahmaputra River, while the Indus River Dolphin is located in the Beas River in India. Irrawaddy Dolphins are known to inhabit the brackish waters of Chilika Lake. The snow leopard is the flagship species of Hemis National Park in Ladakh. Mapping these species to their specific habitats is essential for effective regional wildlife conservation.

67. (3) It frequently roars loudly to establish territory.
The snow leopard is famously known as the "Ghost of the Mountains" due to its elusive nature and serves as an indicator of high-altitude ecosystem health. Its diet primarily consists of wild sheep and goats. Uniquely, unlike other big cats like lions or tigers, the snow leopard lacks the laryngeal morphology required to roar, making the claim of frequent roaring scientifically incorrect.

68. (4) High level of health and biodiversity in the freshwater ecosystem.
The Gangetic dolphin is considered an apex predator in the riverine food web. Its presence in a river segment is a reliable indicator of a healthy freshwater ecosystem. Because these dolphins require clean water and an abundant supply of fish to survive, a thriving population suggests low pollution levels and high biodiversity in that particular stretch of the river system.

69. (3) Project Cheetah
Projects for the Tiger, Elephant, and Snow Leopard are long-standing flagship conservation initiatives in India aimed at protecting native species in their natural habitats. Project Cheetah, however, involves the reintroduction of an extinct species brought from Africa to India. This focus on reintroduction makes it distinct from the traditional in-situ conservation projects designed for species that were never globally lost.

70. (3) Both Statement I and Statement II are correct.
Snow leopards face severe threats from poaching, climate change, and retaliatory killing by herders whose livestock are preyed upon. To address these challenges, the Global Snow Leopard and Ecosystem Protection Program was formed as an alliance among the twelve countries where the species is found. Both statements accurately reflect the primary threats to the species and the international collaborative response.

71. (4) Rights allowed in Sanctuaries but strictly prohibited in National Parks.
Both National Parks and Wildlife Sanctuaries are protected areas under the Wildlife Protection Act. The primary legal difference lies in the degree of restriction. In a Wildlife Sanctuary, certain human activities and rights, such as livestock grazing or collection of minor forest produce, may be permitted by the Chief Wildlife Warden. In contrast, such activities are strictly prohibited in National Parks.

72. (1) A-ii, B-i, C-iv, D-iii
India's biosphere reserves are located in ecologically significant areas across the country. Nanda Devi is situated in the Himalayan state of Uttarakhand, while Nokrek is in Meghalaya. Pachmarhi is a prominent reserve in Madhya Pradesh, and Similipal is located in the state of

Downloaded from www.pdf.tube

Odisha. These reserves are designed to protect large-scale ecosystems and promote sustainable development through active community involvement.

73. (2) II, I, III
A Biosphere Reserve is organized into three distinct zones. The outermost area is the Transition Zone, where human settlements and sustainable activities occur. Moving inward, the Buffer Zone surrounds the core and is used for research and education. The innermost part is the Core Zone, which is a strictly protected area dedicated to the conservation of biodiversity with no human interference.

74. (4) I, II, III, IV and V
UNESCO's Man and the Biosphere (MAB) program recognizes biosphere reserves that demonstrate a balanced relationship between people and nature. In India, numerous reserves have received this international designation, including Nilgiri, Gulf of Mannar, Sunderban, Nanda Devi, and Panna. These sites are part of the World Network of Biosphere Reserves, facilitating global cooperation in conservation, research, and sustainable development.

75. (4) Hailey National Park (now Jim Corbett)
Established in 1936 in the Nainital district of the United Provinces, Hailey National Park was the first national park to be created in India. It was later renamed Ramganga National Park and eventually Jim Corbett National Park in honor of the famous hunter-turned-conservationist. Its establishment marked the beginning of formal protected area management for wildlife conservation in the country.

76. (2) Private or community lands protected for flora, fauna, and traditions.
Community Reserves are a category of protected areas introduced in the 2002 amendment of the Wildlife Protection Act. These reserves are established on private or community-owned lands where local individuals or groups have volunteered to conserve the flora, fauna, and traditional values. They facilitate conservation outside of government-owned forests and emphasize the role of local people in protecting their natural environment.

77. (3) Wildlife Sanctuary - Complete ban on collection of minor forest produce.
In the core zone of a biosphere reserve, human activity is strictly prohibited, while the transition zone allows for active cooperation with local communities. Unlike national parks, wildlife sanctuaries do not have a complete ban on the collection of minor forest produce. Such activities can be permitted by the Chief Wildlife Warden if they do not interfere with specific wildlife conservation goals.

NODIA

78. (1) Both A and R are true and R is the correct explanation of A.
Conservation Reserves are established on government-owned land, particularly in areas adjacent to National Parks and Sanctuaries. These reserves are designed to act as vital buffer zones or migratory corridors, enhancing conservation at the landscape level. Because they provide connectivity between established protected areas, the reasoning accurately explains the strategic ecological purpose of declaring these specific regions as Conservation Reserves today.

79. (1) Chilika Lake
India has identified eighteen biosphere reserves, including Cold Desert, Seshachalam Hills, and Achanakmar-Amarkantak. While Chilika Lake is a highly significant wetland, a Ramsar site, and a major biodiversity hotspot, it is not officially notified as one of the eighteen Biosphere Reserves under the national program. It is primarily managed as a wetland ecosystem rather than a multi-zoned biosphere reserve under MAB.

80. (2) A transition zone acting as a 'shock absorber' for protected areas.
Eco-Sensitive Zones are notified around National Parks and Sanctuaries to create a transition area between highly protected habitats and areas with intensive human activity. These zones act as "shock absorbers" by regulating certain activities to minimize the negative impact of development on the core ecosystem. They help maintain ecological stability without requiring the total relocation of all local human populations nearby.

81. (2) Great Indian Bustard (Godawan)
Desert National Park, located in the Jaisalmer and Barmer districts, is one of the last strongholds of the Great Indian Bustard. Locally known

as Godawan, this critically endangered bird is the state bird of Rajasthan. The park's vast grasslands and scrublands provide the essential habitat required for the survival and breeding of this majestic and highly threatened species in western India.

82. (1) I and II only
Ranthambore National Park is famously situated at the junction of the Aravalli and Vindhya mountain ranges and is a major site for Bengal tiger conservation. However, it is located in the Sawai Madhopur district, not Jaisalmer. Therefore, while the geological and biological descriptions are accurate, the geographical location provided in the third statement is incorrect, making only the first two valid.

83. (1) A-iii, B-iv, C-i, D-ii
Keoladeo National Park is historically famous for the wintering Siberian Crane. Desert National Park is the primary habitat for the Great Indian Bustard. Sitamata Wildlife Sanctuary is uniquely known for the presence of the flying squirrel. Tal Chhapar Sanctuary provides a specialized habitat for the blackbuck. Mapping these species to their respective protected areas highlights the extremely diverse and unique wildlife of Rajasthan.

84. (4) World's first reserve to successfully re-establish tigers through relocation.
Sariska Tiger Reserve, located in the Alwar district, made history as the first reserve in the world where tigers were successfully reintroduced after the local population had been completely wiped out. This groundbreaking relocation project involved moving tigers from Ranthambore to Sariska. The reserve is also home to leopards and various other species, but its success in tiger re-establishment remains its achievement.

85. (3) Kota, Bundi, Chittorgarh and Jhalawar
Mukundra Hills Tiger Reserve, also known as Darrah, is located in southeastern Rajasthan. Its territory is spread across the districts of Kota, Bundi, Chittorgarh, and Jhalawar. This reserve encompasses the Darrah, Jawahar Sagar, and Chambal Wildlife Sanctuaries. It represents a vital hilly and forested landscape that supports a variety of wildlife and was notified to expand the tiger habitat in the state.

86. (2) Tropical thorn forests and scrublands
The Desert National Park is situated within the Thar Desert and experiences extreme arid conditions. Consequently, the dominant vegetation consists of tropical thorn forests and scrublands. These ecosystems are characterized by drought-resistant species like Khejri, Rohida, and various grasses. This vegetation is perfectly adapted to the low rainfall and high temperatures of the western Rajasthan landscape, supporting specialized desert wildlife.

87. (3) Both Statement I and Statement II are correct.
Keoladeo National Park, formerly known as the Bharatpur Bird Sanctuary, is a world-renowned avifauna reserve. It has been designated as a Ramsar Wetland site due to its ecological importance for migratory birds. Additionally, its exceptional biodiversity and habitat value led to its recognition as a UNESCO World Heritage Site. Both statements accurately describe the history and international status of this area.

88. (2) II, I, III
Geographically, Keoladeo National Park in Bharatpur is the easternmost. Moving westward, Ranthambore National Park is located in Sawai Madhopur. Finally, Desert National Park is situated in the far west, spanning the districts of Jaisalmer and Barmer. This sequence correctly reflects the transition from the eastern plains through the central hills to the western desert regions of the state of Rajasthan.

89. (3) Kumbhalgarh
As of 2023, Rajasthan has several notified tiger reserves, including Ranthambore, Sariska, Mukundra Hills, and the recently added Ramgarh Vishdhari. While there have been proposals and discussions regarding the inclusion of Kumbhalgarh as a tiger reserve, it has not yet received the official statutory notification under the Wildlife Protection Act, making it the only site listed that is not a tiger reserve.

90. (1) Sangai (State Animal - Domestic)
Rajasthan's state symbols include the Khejri tree, the Rohida flower, the Chinkara as the wild state animal, and the Camel as the domestic state animal. The Sangai is a brow-antlered deer that is endemic to Manipur and has no connection to the state symbols or natural biodiversity of

Click Here to Buy book on Amazon

while promoting economic growth in the twenty-first century.

125. (3) Intergenerational equity
Intergenerational equity is a core principle of sustainable development that emphasizes fairness between generations. It requires the current generation to manage natural resources and the environment in a way that preserves their value and availability for those who will follow. This ensures that today's development does not occur at the expense of the well-being and opportunities of future inhabitants.

126. (4) Balancing economic growth, social well-being, and environmental health.
Sustainable development is not about stopping growth or ignoring environmental damage. Instead, it is a holistic approach that seeks to balance three competing interests: economic growth, social well-being, and environmental health. By integrating these dimensions, the concept promotes a path where human prosperity is achieved without destroying the ecological systems and social foundations upon which all life and development depend.

127. (3) Both Statement I and Statement II are correct.
The Brundtland definition of sustainable development explicitly highlights the importance of meeting the essential needs of the world's poor as a priority. It also acknowledges that the environment's capacity to provide resources is limited by the current state of technology and social organization. Both statements accurately reflect the nuanced understanding of development and limitations presented in the original commission's report.

128. (1) A-iii, B-i, C-ii, D-iv
The 1972 Stockholm Conference was the first major UN meeting on the environment. The Brundtland Report of 1987 established the standard definition of sustainable development. The 1992 Rio Summit resulted in the adoption of Agenda 21. Finally, the Rio+20 conference in 2012 focused on the "Green Economy." Correctly matching these events is essential for understanding the history of global environmental policies.

NODIA

129. (2) It encourages the overexploitation of non-renewable resources.
Sustainable development advocates for a transition towards renewable energy and promotes sustainable consumption and production patterns. It requires the integration of economic, social, and environmental policies to ensure long-term viability. Conversely, encouraging the overexploitation of non-renewable resources is fundamentally opposed to the principles of sustainability, as it depletes materials that future generations will need, making this statement incorrect.

130. (1) Principle of limitless consumption
Sustainable development is based on several key principles, including the integration of policies, the precautionary principle for avoiding environmental harm, and the polluter pays principle for internalizing costs. However, the idea of limitless consumption is incompatible with sustainability. True sustainable development recognizes that resources are finite and advocates for responsible consumption that stays within the ecological limits of the planet.

131. (3) 17
The 2030 Agenda for Sustainable Development, adopted by the United Nations in 2015, is centered around seventeen Sustainable Development Goals. These goals are a universal call to action to end poverty, protect the planet, and ensure that all people enjoy peace and prosperity by the year 2030. Each goal includes specific targets and indicators to measure global progress.

132. (1) II, III, IV, I
The first four Sustainable Development Goals are ordered to address the most fundamental aspects of human well-being. SDG 1 is "No Poverty," followed by SDG 2, which aims for "Zero Hunger." SDG 3 focuses on "Good Health and Well-being," and SDG 4 is dedicated to "Quality Education." This sequence reflects the logical progression of meeting basic human needs and capabilities.

133. (4) I, II, III, IV and V
While all seventeen SDGs are interconnected, several goals focus specifically on the environment and natural resources. These include SDG 6 for water, SDG 7 for energy, SDG 13 for climate action, and SDGs 14 and 15 for life in water and

99. (3) Start ex-situ measures like captive breeding to prevent imminent extinction.
When a species' natural habitat becomes severely and irreversibly fragmented, in-situ conservation may no longer be sufficient to ensure its survival. In such extreme cases, conservationists must implement ex-situ measures, such as captive breeding programs in zoos or specialized centers. These efforts aim to stabilize the population and preserve the species' genetic lineage until potential reintroduction into the wild becomes feasible.

100. (4) Zoological Garden
Wildlife sanctuaries, national parks, and marine protected areas are all forms of in-situ conservation, as they involve protecting species within their natural ecosystems. A zoological garden, however, is an ex-situ conservation method where animals are kept and managed in human-made enclosures outside their original habitats. This fundamental difference in the location of the conservation effort makes it the odd one out.

101. (3) The Earth Summit (UNCED) in Rio de Janeiro, 1992.
The Convention on Biological Diversity was one of the key international treaties opened for signature during the United Nations Conference on Environment and Development, popularly known as the Earth Summit. Held in Rio de Janeiro in 1992, this landmark event brought global attention to the urgent need for biodiversity conservation and established the first comprehensive international framework for protecting nature.

102. (3) I, II, III and IV only
The Convention on Biological Diversity is a legally binding treaty with three primary goals: conserving biodiversity, ensuring the sustainable use of its components, and the fair sharing of benefits from genetic resources. While it recognizes national sovereignty, it does not prohibit nations from using their resources; instead, it encourages sustainable management. Thus, the first four statements accurately define its nature.

103. (4) Safe handling, transport, and use of Living Modified Organisms (LMOs).
Adopted in 2000 as a supplement to the CBD, the Cartagena Protocol on Biosafety focuses on protecting biological diversity from the potential risks posed by living modified organisms resulting from modern biotechnology. It establishes procedures for the safe handling, transport, and use of LMOs, particularly focusing on their transboundary movement to ensure that environmental and human health are not compromised.

NODIA

104. (1) A set of 20 time-bound targets from 2010 to halt biodiversity loss by 2020.
The Aichi Biodiversity Targets were a series of twenty ambitious, time-bound goals adopted in Nagoya, Japan, in 2010. Part of the Strategic Plan for Biodiversity, these targets were intended to be achieved by 2020 to halt the global loss of biodiversity. They covered a wide range of issues, from addressing the causes of loss to improving the status of ecosystems globally.

105. (3) Both Statement I and Statement II are correct.
India enacted the Biological Diversity Act in 2002 to create a legal framework for managing its rich biological resources. This legislation was specifically designed to fulfill India's international obligations as a signatory to the Convention on Biological Diversity. Both statements accurately reflect the timing of the Act and its fundamental purpose in aligning national law with global biodiversity conservation standards.

106. (1) It allows foreign individuals to access India's biological resources freely without any prior approval.
The Biological Diversity Act established a decentralized three-tier structure consisting of the National Biodiversity Authority, State Biodiversity Boards, and local Biodiversity Management Committees. A key provision of the Act is the regulation of access to biological resources. The claim that foreign individuals can access these resources freely is incorrect, as the law mandates strict prior approval from the NBA for such activities.

107. (4) Kyoto Protocol
The Cartagena Protocol, Nagoya Protocol, and the Kunming-Montreal Global Biodiversity

Rajasthan, making it the clear odd one out in this specific context.

91. (4) Conservation of species within their natural ecosystem or habitat.
In-situ conservation is the practice of protecting and managing wildlife and plant species within their natural surroundings. This approach focuses on maintaining the entire ecosystem and the natural processes that allow species to thrive. By establishing protected areas like national parks and sanctuaries, conservationists ensure that biodiversity is preserved in the environment where it naturally evolved and continues to interact.

92. (2) Maintenance and breeding of endangered species outside natural habitats.
Ex-situ conservation involves the protection of biological diversity outside of its natural habitats. This method is often used for species that are critically endangered and cannot survive in the wild due to habitat destruction or other threats. Examples include botanical gardens, zoos, and gene banks, where individuals or genetic materials are maintained under human supervision to prevent complete extinction.

93. (3) I, II and IV only
Ex-situ conservation methods involve maintaining species outside their natural environments. Seed banks, botanical gardens, and cryopreservation are all examples of this approach, as they involve human-managed storage or cultivation. Biosphere reserves, however, are a form of in-situ conservation because they protect entire ecosystems in their natural state. Therefore, only the seed banks, gardens, and cryopreservation techniques belong to the ex-situ category.

94. (4) Sacred Grove - In-situ conservation
Sacred groves are natural forest patches protected by local communities in their original locations, representing a traditional form of in-situ conservation. In contrast, wildlife sanctuaries are also in-situ, while zoological parks and tissue culture are ex-situ methods because they occur outside natural habitats. Therefore, the pairing of sacred groves with in-situ conservation is the only scientifically and technically accurate choice.

95. (1) A-i, B-iii, C-iv, D-ii
National Parks represent government-protected in-situ conservation. Gene Banks are ex-situ methods for storing genetic material. Sacred Lakes are examples of community-protected in-situ conservation based on cultural traditions. Aquariums serve as ex-situ centers for maintaining live aquatic species. Mapping these examples correctly illustrates the diversity of strategies used to preserve biological resources both within and outside their natural environments.

96. (2) Seeds are stored at high temperatures and humidity to ensure survival.
Seed banks are a vital ex-situ conservation tool designed to preserve genetic diversity. They store seeds for long-term recovery and research, as exemplified by the Svalbard Global Seed Vault. However, the claim that seeds are stored at high temperatures is incorrect. Successful seed preservation actually requires controlled, very low temperatures and low humidity to maintain seed viability and prevent premature germination.

97. (2) To preserve genetic material at ultra-low temperatures without loss of viability.
Cryopreservation is a sophisticated ex-situ conservation technique used to store biological materials like seeds, pollen, and animal gametes. By using liquid nitrogen to achieve ultra-low temperatures, usually around minus 196 degrees Celsius, genetic material can be preserved for decades without losing its viability. This method provides a "genetic backup" for endangered species that might face sudden extinction in the wild.

98. (1) Acting as ex-situ conservation centers for rare and threatened plant species.
Botanical gardens serve as critical ex-situ conservation facilities by cultivating and maintaining living collections of diverse plant species. They focus on preserving rare, endemic, and threatened plants that may be at risk in their natural habitats. These institutions also conduct research on plant propagation and public education, playing a vital role in global efforts to prevent the loss of floral diversity.

Downloaded from www.pdf.tube

116. (1) Statement I is correct, and Statement II is incorrect.
The Nagoya Protocol requires user countries to implement compliance measures to ensure that genetic resources used within their borders were accessed through Prior Informed Consent. Contrary to the second statement, the protocol explicitly addresses the rights of indigenous and local communities, mandating that their traditional knowledge associated with genetic resources must also be subject to benefit-sharing and consent requirements.

117. (3) It applies exclusively to human genetic resources.
The Nagoya Protocol entered into force in 2014 and provides a legal framework for implementing the CBD's benefit-sharing objectives. India is an active signatory and has ratified the treaty. However, the protocol specifically excludes human genetic resources from its scope. It applies to genetic resources from plants, animals, and microorganisms, as well as the traditional knowledge associated with them globally.

118. (2) Access to traditional knowledge must be subject to prior informed consent.
Under the Nagoya Protocol, traditional knowledge associated with genetic resources is treated with significant legal protection. It is not considered public domain for free commercial use. Instead, the protocol mandates that access to such knowledge held by indigenous and local communities must be granted only with their prior informed consent and based on mutually agreed terms for sharing the benefits fairly.

119. (4) Biopiracy
Biopiracy occurs when researchers or companies use biological resources or traditional knowledge without official permission or fair compensation to the source country or community. The strict implementation of Access and Benefit Sharing mechanisms under the Nagoya Protocol is a direct international response to this problem. By creating legal obligations, the protocol helps ensure that the benefits of nature are shared equitably.

120. (1) Montreal Protocol
The Convention on Biological Diversity, along with its Nagoya and Cartagena Protocols, forms a cohesive international framework specifically focused on the protection and management of biological diversity. The Montreal Protocol, however, is a separate treaty designed to phase out the production of substances that deplete the ozone layer. This atmospheric focus makes it the odd one out in this specific context.

121. (3) The Brundtland Commission
The most widely recognized definition of sustainable development was introduced by the World Commission on Environment and Development, popularly known as the Brundtland Commission. Led by Gro Harlem Brundtland, the commission emphasized that development must meet the needs of the current population while ensuring that future generations are not left with depleted resources or a degraded environment to meet their needs.

122. (1) Our Common Future
Published in 1987, the landmark report of the Brundtland Commission was titled "Our Common Future." This document was pivotal in placing the concept of sustainable development on the global political agenda. It argued that environmental protection and economic growth are not mutually exclusive but must be integrated to ensure a viable future for humanity across all nations and generations.

123. (1) I, II and III
Sustainable development is built upon three interdependent and mutually reinforcing pillars: economic development, social equity, and environmental protection. For development to be truly sustainable, it must balance the need for economic growth with the goal of social inclusion and the necessity of preserving the natural environment. Military supremacy is not considered one of the core dimensions of this framework.

124. (2) Earth Summit (Rio de Janeiro), 1992.
Agenda 21 is a comprehensive global plan of action for sustainable development that was adopted by over 178 governments at the United Nations Conference on Environment and Development. This historic meeting, held in Rio de Janeiro in 1992, established a blueprint for international cooperation to address environmental degradation and social inequality

NODIA

143. (1) The CGWA regulates and controls groundwater development and management.
The Central Ground Water Authority is the statutory body in India responsible for regulating and controlling the development and management of groundwater resources. This is critical because India is one of the world's largest extractors of groundwater, primarily for agricultural irrigation. Unlike the incorrect claims, groundwater is a finite resource that requires active recharge and management to prevent severe depletion.

144. (2) It encourages illegal and unregulated mining for rapid economic growth.
Sustainable mineral management aims to reduce the environmental impact of extraction through recycling and the restoration of mined-out areas. It requires careful planning and legal oversight to ensure that mining does not permanently destroy local ecosystems. Encouraging illegal and unregulated mining is entirely contrary to these principles, as such activities lead to severe environmental degradation and the loss of natural capital.

145. (2) Soil and water in a defined drainage basin.
Watershed management is a localized, holistic approach that focuses on the conservation and protection of soil and water resources within a specific drainage basin. By managing the runoff and preventing soil erosion, this strategy improves water availability, enhances agricultural productivity, and restores the ecological health of the entire area. It is a fundamental tool for sustainable rural development.

146. (1) Statement I is correct, and Statement II is incorrect.
Afforestation and reforestation are essential strategies for restoring forest cover and halting desertification. However, the second statement is incorrect because monoculture plantations, which consist of a single species, do not provide the same levels of biodiversity or ecological resilience as natural, multi-species forests. Natural forests support a wider range of life forms and are better equipped to withstand environmental stresses.

147. (3) Increase in groundwater tables in over-exploited blocks.
Poor water resource management leads to several negative environmental outcomes, including the depletion of aquifers, saltwater intrusion in coastal regions, and the deterioration of water quality due to unchecked pollution. In contrast, an increase in groundwater tables is a positive result of effective management and recharge efforts, making it the only option that is not a consequence of poor management practices.

148. (4) Afforestation and regeneration to compensate for diverted forest land.
The Compensatory Afforestation Fund Management and Planning Authority was created to manage funds collected from project proponents who divert forest land for non-forest purposes. These CAMPA funds are strictly intended for compensatory afforestation, assisted natural regeneration, and the protection of forests. This mechanism ensures that the loss of forest cover in one area is balanced by the creation of new forests.

149. (3) Greater frequency and severity of landslides and flash floods.
In hilly regions, tree roots play a crucial role in binding the soil and regulating the flow of rainwater. When unregulated deforestation occurs, this protective cover is lost, leading to increased soil instability. Consequently, the region becomes much more vulnerable to frequent and severe landslides and flash floods, as the land can no longer absorb heavy rainfall or resist gravity-driven erosion.

150. (2) Coal
Solar energy is an inexhaustible resource, while forests and groundwater can be considered renewable if they are harvested and managed sustainably over time. Coal, however, is a fossil fuel formed over millions of years from decaying organic matter and is depleted as it is consumed. This lack of replenishment on a human timescale makes coal a non-renewable resource and the out.

151. (4) Energy from natural sources replenished faster than they are consumed.
Renewable energy is defined by its ability to be naturally replenished on a human timescale.

Click Here to Buy book on Amazon

on land. Together, they form a comprehensive framework for protecting the planet's ecosystems and ensuring the sustainable use of resources globally.

134. (2) NITI Aayog
In India, NITI Aayog is the premier policy think tank responsible for coordinating the implementation of the Sustainable Development Goals. It plays a crucial role in monitoring progress through the SDG India Index, which ranks states and union territories on their performance. This competitive and cooperative framework encourages sub-national governments to prioritize sustainable development in their specific local policies and budgets.

135. (4) SDG 11 - Sustainable Cities and Communities
Each Sustainable Development Goal is dedicated to a specific global challenge. SDG 11 aims to make cities and human settlements inclusive, safe, resilient, and sustainable. In contrast, SDG 5 focuses on gender equality, SDG 8 on decent work and economic growth, and SDG 16 on peace, justice, and strong institutions. Therefore, the pairing for SDG 11 is the only correct one.

136. (1) SDG 14 - Life on Land
The Sustainable Development Goals have specific numbering. SDG 1 is dedicated to ending poverty, SDG 2 aims for zero hunger, and SDG 13 focuses on climate action. However, SDG 14 is specifically concerned with "Life Below Water," focusing on marine resources. "Life on Land" is the subject of SDG 15, making the pairing of SDG 14 with land incorrect and inaccurate.

137. (1) Statement I is correct, and Statement II is incorrect.
The Sustainable Development Goals were introduced in 2015 to replace the Millennium Development Goals, which had guided global development since 2000. While the MDGs primarily targeted developing nations, the SDGs are universal and apply to all countries regardless of their income level. Therefore, only the statement regarding the replacement of the MDGs is correct, as the second statement is false.

138. (1) The Decade of Action
Recognizing that global efforts were not on track to meet the 2030 targets, the United Nations officially designated the period from 2020 to 2030 as the "Decade of Action." This initiative calls for accelerating sustainable solutions to all the world's biggest challenges, ranging from poverty and gender inequality to climate change and closing the finance gap for the goals.

139. (4) Total annual production of ozone-depleting substances for industrial expansion.
Progress on the SDGs is measured using indicators like poverty levels, maternal mortality ratios, and forest cover percentages. These metrics reflect improvements in social and environmental health. Conversely, increasing the production of ozone-depleting substances is harmful to the environment and directly contradicts the goals of sustainability and climate action. Therefore, such a measurement would never be used to show positive progress.

NODIA

140. (2) Profit
The 2030 Agenda for Sustainable Development is shaped by five overarching themes known as the "5 Ps": People, Planet, Prosperity, Peace, and Partnership. These themes represent the interconnected nature of the goals. While economic prosperity is included, "Profit" is not one of the official themes, as the focus is on broad human well-being and environmental health rather than just commercial gains.

141. (3) Managing interactions between people and landscapes to sustain natural resources.
Natural Resource Management is a holistic approach that focuses on how people interact with the natural world. It involves the sustainable use and protection of resources like land, water, soil, plants, and animals. The goal is to ensure that these resources provide for current human needs while maintaining the health of the landscape and its ability to support future generations.

142. (4) 33%
The National Forest Policy of 1988 established a fundamental ecological goal for India: to have a minimum of one-third of the total geographical area under forest or tree cover. Specifically, it recommends thirty-three percent for the country as a whole, with a higher target of sixty-six percent for mountainous and hilly regions to prevent soil erosion and maintain ecological stability.

Framework are all international agreements directly linked to the Convention on Biological Diversity. The Kyoto Protocol, however, is a treaty under the United Nations Framework Convention on Climate Change (UNFCCC) specifically addressing greenhouse gas emissions. Therefore, it is the only listed framework that is not part of the CBD system.

108. (1) Both A and R are true and R is the correct explanation of A.
Before the CBD, genetic resources were often exploited by foreign entities as the "common heritage of mankind" without compensating the source nations. The CBD shifted this paradigm by explicitly recognizing the sovereign rights of States over their own biological resources. This change was essential to empower nations to regulate access and ensure they receive a fair share of benefits from utilization.

109. (3) Living Modified Organism
Within the context of the Cartagena Protocol on Biosafety, the acronym LMO stands for Living Modified Organism. This term refers to any living organism that possesses a novel combination of genetic material obtained through the use of modern biotechnology. The protocol focuses on the safe transboundary movement and handling of these organisms to prevent potential adverse effects on biological diversity.

110. (4) Access and Benefit Sharing (ABS)
Access and Benefit Sharing is a central principle of the Convention on Biological Diversity. It mandates that when a company or researcher accesses genetic resources or traditional knowledge from another country for commercial use, they must share the resulting benefits fairly with the provider. This mechanism ensures that biodiversity-rich nations and local communities are compensated for their contribution to scientific innovation.

111. (1) Fair and equitable sharing of benefits from the use of genetic resources.
While the CBD has three main goals, the Nagoya Protocol specifically provides a detailed legal framework for the third objective: the fair and equitable sharing of benefits arising from the utilization of genetic resources. By establishing clear rules on access and compliance, the protocol aims to prevent biopiracy and ensure that the providers of genetic resources receive a just share.

112. (2) Japan
The Nagoya Protocol was adopted on October 29, 2010, during the tenth meeting of the Conference of the Parties to the CBD. This historic meeting took place in Nagoya, Japan. The protocol represents a major international effort to clarify the rules for accessing genetic resources and sharing the benefits derived from their use, particularly for research and commercial development purposes worldwide.

113. (4) I, II and III
The Nagoya Protocol is built upon three core pillars of obligation: access, benefit-sharing, and compliance. Access obligations require countries to create clear rules for obtaining resources. Benefit-sharing mandates that users share rewards with providers. Compliance obligations ensure that users follow the rules and that provider countries can enforce their rights. Together, these pillars create a balanced framework for international genetic exchange.

114. (1) National Biodiversity Authority (NBA)
In India, the National Biodiversity Authority is the statutory body established under the Biological Diversity Act of 2002. One of its primary roles is to manage the Access and Benefit Sharing mechanism. Any foreign entity wishing to access India's biological resources or traditional knowledge for commercial utilization must obtain prior approval and enter into a formal agreement with the NBA.

115. (3) Prior Informed Consent (PIC) - Permission obtained from the provider country before accessing genetic resources.
Prior Informed Consent is a fundamental requirement of the Nagoya Protocol, signifying that a user must obtain permission from the provider country before accessing its genetic resources. In contrast, Mutually Agreed Terms represent a negotiated agreement between both parties, not a unilateral declaration. This terminology ensures that the sovereign rights of the provider country are respected throughout the entire access process.

Downloaded from www.pdf.tube

Unlike fossil fuels, which are finite and take millions of years to form, sources like sunlight, wind, and water are constantly available and are replenished faster than they are used. Utilizing these clean sources is essential for reducing carbon emissions and achieving long-term energy security globally.

152. (1) Gurugram, India
The International Solar Alliance is a treaty-based intergovernmental organization launched by India and France to promote the efficient exploitation of solar energy. Its primary goal is to reduce reliance on fossil fuels. The headquarters of the ISA is located at the National Institute of Solar Energy in Gurugram, India, making it the first such international organization to be headquartered in India.

153. (3) Tamil Nadu and Gujarat are among the leading states in wind power installation in India.
India has significant wind energy potential, particularly along its long coastline. The states of Tamil Nadu and Gujarat have emerged as leaders in wind power installation due to favorable wind speeds and government support. Unlike polluting fossil fuels, wind energy is a clean, renewable source that generates electricity without emitting greenhouse gases, playing a key role in India's transition to sustainable power.

154. (1) Biomass energy is a non-renewable source because plants take millions of years to grow.
Biomass energy is a renewable resource derived from organic materials like plant and animal waste. Biogas is a key product of this energy source, produced through anaerobic digestion. Because plants can be regrown in a relatively short time, the claim that biomass is non-renewable due to a million-year growth cycle is factually incorrect. Biomass provides a sustainable way to manage waste.

155. (4) PV uses semiconductors for electricity, while CSP uses mirrors and heat.
Solar Photovoltaic technology converts sunlight directly into electricity using semiconductor materials. In contrast, Concentrated Solar Power uses mirrors or lenses to focus a large area of sunlight onto a receiver. This heat is then used to drive a steam turbine that generates power. This fundamental difference in energy conversion mechanisms distinguishes the two most common types of large-scale solar technologies.

156. (1) Statement I is correct, and Statement II is incorrect.
Transitioning to renewable energy is a critical requirement for meeting the global climate targets established under the Paris Agreement. While India is rapidly expanding its renewable capacity, these sources do not yet provide one hundred percent of the country's total energy consumption. Fossil fuels still play a major role in the energy mix, making the second statement an incorrect exaggeration of current reality.

157. (3) Bhadla Solar Park - Rajasthan
India is home to several of the world's largest renewable energy projects. Bhadla Solar Park, located in Rajasthan, is currently the largest solar park in the world. In contrast, the Kamuthi Solar Project is in Tamil Nadu, and the Muppandal Wind Farm is also in Tamil Nadu. Charanka Solar Park is situated in Gujarat, not Tamil Nadu, making the Rajasthan pair correct.

158. (4) High solar radiation, clear sunny days, and vast wasteland availability.
Rajasthan has the highest potential for solar energy in India due to its unique geographic and climatic advantages. The state receives intense solar radiation and enjoys a high number of clear, sunny days throughout the year. Additionally, the availability of vast stretches of uncultivated wasteland in the desert regions provides the necessary space for the installation of large-scale solar power plants.

159. (1) They cause forest submergence, community displacement, and ecosystem disruption.
While large-scale hydroelectric projects generate significant amounts of renewable energy, they are often debated because of their high social and environmental costs. The construction of massive dams leads to the submergence of vast forest areas and the displacement of local and indigenous communities. These projects can also disrupt river ecosystems and alter natural water flows, raising concerns about their overall sustainability.

NODIA

160. (2) Natural gas
Geothermal, tidal, and small hydropower are all considered renewable energy sources because they rely on natural processes that are replenished on a human timescale. Natural gas, however, is a fossil fuel formed over millions of years from decaying organic matter. Like coal and oil, it is a finite resource that is depleted by use and contributes significantly to greenhouse gas emissions.

161. (2) An economy improving well-being and equity while reducing ecological risks.
The United Nations Environment Programme defines a green economy as one that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities. In a green economy, growth in income and employment is driven by public and private investments that reduce carbon emissions and pollution, enhance energy efficiency, and prevent the loss of biodiversity.

162. (1) Subtracting costs of environmental degradation and resource depletion.
Green GDP is an economic indicator that seeks to measure growth while accounting for environmental consequences. It adjusts the traditional Gross Domestic Product by subtracting the estimated monetary costs of environmental degradation and the depletion of natural resources. This provides a more accurate picture of a nation's true economic health by considering whether growth is occurring at the expense of natural capital.

163. (3) Designing to minimize waste through continuous use, recycling, and regeneration.
A circular economy is an alternative to the traditional linear 'take-make-dispose' model. It focuses on designing products and systems to minimize waste and pollution by keeping materials and products in use for as long as possible. Through recycling, repairing, and regeneration, this model aims to decouple economic activity from the consumption of finite resources, promoting long-term sustainability and environmental health.

164. (4) It implies a complete halt to all industrial manufacturing and technological advancement.
Transitioning to a green economy involves shifting to renewable energy, decoupling growth from resource use, and creating new "green jobs" in sustainable sectors. It does not mean stopping industrial manufacturing or technology. Instead, it promotes the transformation of these sectors through innovation and efficiency to ensure that economic development occurs within planetary boundaries and does not cause further environmental destruction.

165. (3) Achieving growth without increasing environmental pressure and resource use.
In the context of a green economy, decoupling refers to the ability of an economy to grow without a proportional increase in environmental pressure. This means that as economic output rises, the consumption of natural resources and the generation of pollution either stay constant or decrease. Achieving this balance is essential for ensuring that economic development is sustainable and does not lead collapse.

166. (3) Both Statement I and Statement II are correct.
A green economy is driven by energy efficiency and eco-innovation, which help reduce the environmental impact of economic activity. It also fundamentally recognizes that natural capital, such as healthy forests and wetlands, provides essential services and represents a critical economic asset for any nation. Both statements accurately reflect the core principles and values that define a modern, sustainable economic model.

167. (4) A coalition of UN agencies (UNEP, ILO, UNDP, UNIDO, UNITAR)
The Partnership for Action on Green Economy was launched as a direct response to the call at Rio+20 for the UN system to support countries in their transition to a green economy. It brings together the expertise of five UN agencies—UNEP, ILO, UNDP, UNIDO, and UNITAR—to provide integrated support on policy development, capacity building, and knowledge sharing for sustainable growth.

Click Here to Buy book on Amazon

168. (1) The creation of "green jobs" and stimulation of sustainable economic growth.
When a government redirects investment from fossil fuels toward public transportation and renewable energy, it stimulates a transition toward a more sustainable economy. A major positive effect of this shift is the creation of numerous "green jobs" in emerging sectors like wind power and electric mobility. This approach fosters technological innovation and promotes long-term economic growth that is decoupled from environmental degradation.

169. (3) Providing massive subsidies for fossil fuel extraction.
Promoting a green economy involves tools like carbon pricing, green bonds, and extended producer responsibility to encourage sustainable practices. Conversely, providing massive subsidies for fossil fuel extraction works against these goals by making polluting energy cheaper and discouraging the transition to renewables. Removing such subsidies is often considered a necessary step in aligning economic incentives with environmental protection and climate action goals.

170. (1) Linear Economy
The circular, green, and blue economies are all modern economic models designed to integrate sustainability, resource efficiency, and environmental protection into development. The linear economy, however, is the traditional 'take-make-dispose' model that ignores environmental limits and leads to resource depletion and waste. This lack of focus on sustainability and regeneration makes the linear model the clear odd one out here.

171. (4) Partnership between communities and forest departments for management.
Joint Forest Management is a decentralized approach to forest conservation in India. It is based on a partnership between local village communities and the state forest department. Under this system, communities take an active role in protecting and managing nearby forest lands. In return for their efforts, they are granted rights to certain forest products and a share in the resulting revenue.

172. (2) West Bengal
The first successful experiment in Joint Forest Management took place in the Arabari forest range of West Bengal in the early 1970s. A forest officer, A.K. Banerjee, involved local villagers in the protection of degraded sal forests. The success of this community-based model in restoring the forest and improving livelihoods paved the way for the formal adoption of JFM nationwide across India.

173. (3) Forming village institutions like Forest Protection Committees.
The institutional framework of Joint Forest Management centers on the formation of village-level institutions, commonly known as Forest Protection Committees or Van Samitis. These committees represent the local community and work in collaboration with the forest department to implement management plans. This structure ensures that local people have a formal voice and a clear role in the conservation of their local resources.

174. (4) The entire revenue from timber sales goes exclusively to the Central Government.
In JFM, local communities are motivated to protect forests through a clear benefit-sharing mechanism. They are allowed to collect non-timber forest produce and receive a significant share of the revenue from the final timber harvest. The claim that all timber revenue goes exclusively to the Central Government is incorrect, as the system is designed to provide direct financial incentives to the communities.

175. (1) Forest tracts protected by communities due to religious and cultural beliefs.
Sacred groves are patches of forest vegetation that are protected by local communities due to their religious, cultural, or spiritual significance. These areas are often dedicated to local deities and are protected by traditional taboos that prohibit the cutting of trees or hunting of animals. They serve as important refuges for biodiversity and represent an ancient form of community-based conservation worldwide.

176. (3) Both Statement I and Statement II are correct.
Community-based conservation is built on the idea that local people, whose lives are intertwined with nature, are the most effective

Downloaded from www.pdf.tube

Which of the above statement(s) is/are correct?
(1) I, II, and III
(2) I, III, and IV
(3) II, III, and IV
(4) I, II, and IV
(5) Question not attempted

24. Which of the following represents a cultural method of pest control in Rajasthan?
(1) Deep summer ploughing to expose pupae
(2) Releasing ladybird beetles in the field
(3) Using light traps to catch nocturnal moths
(4) Spraying concentrated Endosulfan chemicals
(5) Question not attempted

25. The primary reason for integrating biological controls in Rajasthan's agriculture is to:
(1) Completely replace chemical fertilizers
(2) Increase the water-holding capacity of the soil
(3) Reduce chemical dependency and mitigate resistance
(4) Eradicate all persistent weed populations instantly
(5) Question not attempted

26. Identify the incorrect statement regarding the use of biopesticides.
(1) They leave high levels of toxic residues in the soil and groundwater.
(2) Biopesticides are generally less toxic than conventional pesticides.
(3) They often affect only the target pest and closely related organisms.
(4) Bacillus thuringiensis (Bt) is a commonly used bacterial biopesticide.
(5) Question not attempted

27. What is the role of 'Trap Crops' in an IPM strategy?
(1) They are genetically modified to trap nitrogen from the air.
(2) They physically trap moisture in the soil.
(3) They are weeds that hinder the growth of the main crop.
(4) They are grown to attract pests away from the main cash crop.
(5) Question not attempted

28. Which of the following is an example of a mechanical pest control method?
(1) Application of malathion
(2) Manual hand-picking and destruction of egg masses
(3) Introduction of nuclear polyhedrosis virus (NPV)
(4) Adjusting the sowing date to avoid peak pest emergence
(5) Question not attempted

NODIA

29. The use of chemical pesticides in IPM is:
(1) Strictly prohibited in all cases regardless of the pest severity.
(2) Applied as the primary first resort for rapid pest elimination.
(3) Used only as a final resort when alternative methods fail.
(4) Used as routine procedure regardless of actual pest populations.
(5) Question not attempted

30. Which botanical extract is most traditionally utilized by farmers in Rajasthan for its antifeedant and insect-repellent properties?
(1) Eucalyptus leaf oil
(2) Pyrethrum flower base
(3) Rotenone root powder
(4) Neem extract (Azadirachtin)
(5) Question not attempted

31. Precision agriculture relies heavily on which of the following technologies to determine site-specific crop variations?
(1) GPS and GIS technologies
(2) Traditional rain measurement gauges
(3) Manual field tilling equipment
(4) Standard mechanized seed drills
(5) Question not attempted

32. The primary objective of adopting precision agriculture in Rajasthan is to:
(1) Maximize the uniform application of inputs across the entire field regardless of need.
(2) Optimize returns on inputs while preserving resources and reducing environmental impact.
(3) Eliminate the need for any human labor in farming operations.
(4) Shift from food crop production to exclusive cash crop production.

However, the claim that TEK is "static" is incorrect. TEK is fundamentally an adaptive body of knowledge that has constantly evolved and been refined over centuries as communities responded to changing environmental conditions and shifts.

185. (3) Capturing and storing rainwater for security in desert ecosystems.
In the arid landscape of Rajasthan, local communities have long utilized Traditional Ecological Knowledge to manage scarce water resources. Structures like Johads, Bawaris, and Tankas are ingenious examples of traditional rainwater harvesting. Their primary purpose is to capture every drop of rainfall and store it securely for use during long dry periods, ensuring water security for humans and livestock alike.

186. (3) Both Statement I and Statement II are correct.
The Biological Diversity Act of 2002 mandates the creation of People's Biodiversity Registers to document local biological resources and associated traditional knowledge. These registers are prepared by local Biodiversity Management Committees to ensure that this knowledge is formally recorded. This documentation is a critical step in protecting TEK from biopiracy and ensuring that communities receive fair benefits from its utilization.

187. (4) Preventing invalid international patents on traditional knowledge.
The Traditional Knowledge Digital Library is an Indian initiative designed to protect the country's ancient medical knowledge from misappropriation. By digitizing and translating information from traditional systems like Ayurveda and Unani, the TKDL provides patent examiners worldwide with evidence of "prior art." This prevents foreign companies from obtaining invalid patents on traditional practices that have been known for centuries.

188. (2) It leads to better, more sustainable co-management strategies that are socially acceptable and ecologically sound.
Integrating Traditional Ecological Knowledge with modern scientific forestry produces a more comprehensive and effective approach to land management. By combining scientific data with local insights, managers can develop co-management strategies that are both ecologically sound and socially acceptable. This synergy respects the rights and wisdom of local communities while ensuring that forest conservation is grounded in the best evidence.

189. (3) Large-scale genetically modified crop cultivation using synthetic fertilizers.
The Zabo system, bamboo drip irrigation, and the protection of Orans are all time-tested practices that represent Traditional Ecological Knowledge in various parts of India. These methods focus on sustainable resource use and local adaptation. In contrast, large-scale cultivation of genetically modified crops using synthetic fertilizers is a product of modern industrial agriculture and is not part of traditional systems.

190. (4) Surangam (Traditional water management) - Kerala.
Different regions in India have developed unique traditional water management systems. Surangam is a traditional water harvesting system found specifically in the Kasaragod district of Kerala. In contrast, the Apatani system belongs to Arunachal Pradesh, and Johads are typical of Rajasthan. Khadin is a specific runoff farming technique from Jaisalmer, but the Surangam-Kerala pair is the only correctly matched.

191. (1) A tradable permit to emit one tonne of carbon dioxide or equivalent gas.
A carbon credit is a key component of national and international emissions trading schemes. It serves as a tradable certificate or permit that represents the right to emit one metric tonne of carbon dioxide or an equivalent amount of another greenhouse gas. This market-based mechanism provides an economic incentive for companies and nations to reduce their overall carbon footprint and emissions.

192. (2) The Kyoto Protocol (1997).
The Kyoto Protocol was the first international agreement to formally establish market-based mechanisms for reducing greenhouse gas emissions. It introduced three flexible mechanisms, including emissions trading and the Clean Development Mechanism, which popularized the concept of carbon credits. This treaty set the stage for the development of global

Click Here to Buy book on Amazon

guardians of natural resources. The Forest Rights Act of 2006 further empowered these efforts by legally recognizing the rights of forest-dwelling communities over their traditional lands. Both statements accurately reflect the philosophy and the legal strengthening of community-led environmental protection today.

177. (2) 1988
The National Forest Policy of 1988 marked a significant shift in India's approach to forest management by emphasizing the importance of people's participation. It moved away from a purely commercial focus and recognized the need to involve local communities in the protection and development of forests. This policy provided the foundation for the Joint Forest Management circular issued formally in 1990.

178. (1) Regeneration of degraded forest cover and improved livelihood security for local communities.
Successful Joint Forest Management leads to a symbiotic relationship between nature and people. By involving communities in protection, degraded forest areas are allowed to regenerate, leading to increased green cover and biodiversity. Simultaneously, the access to forest products and a share in revenue improves the livelihood security of the villagers. This dual benefit is the hallmark of effective community-based management.

179. (3) Over-abundance of funds preventing proper budget utilization.
Joint Forest Management faces several challenges, including inadequate benefit-sharing, lack of legal tenure for committees, and conflicts between traditional knowledge and modern forestry. However, an "over-abundance" of funds is not a recognized challenge; in fact, many programs struggle with insufficient financial support. This lack of resources often hinders the long-term sustainability and effectiveness of community-based forest protection efforts.

180. (4) Commercial clear-cutting
Sacred groves, the environmental traditions of the Bishnoi community, and Joint Forest Management are all examples of practices that prioritize the protection and sustainable management of natural resources through community involvement. Commercial clear-cutting, however, involves the total removal of trees for immediate profit, which destroys the ecosystem. This destructive industrial practice is the opposite of conservation and the odd out.

181. (3) Adaptive body of knowledge and beliefs about relationships between beings and environment.
Traditional Ecological Knowledge is a cumulative body of knowledge, practice, and belief that has evolved through adaptive processes over generations. It concerns the complex relationships between living beings and their natural environment. Deeply rooted in indigenous cultures, TEK provides a holistic understanding of ecosystems and is passed down through oral traditions, offering valuable insights for sustainable resource management and conservation.

182. (2) Bishnoi
The Bishnoi community of Rajasthan is world-renowned for its deep-rooted commitment to environmental protection. Following the teachings of Guru Jambheshwar, they consider the protection of trees, particularly the Khejri, and wildlife, especially the Blackbuck, as a sacred duty. This tradition was tragically illustrated by the Khejarli massacre, where many Bishnois sacrificed their lives to prevent the felling of forest trees.

183. (4) Valuable insights for climate adaptation and biodiversity conservation.
Far from being irrelevant, Traditional Ecological Knowledge is increasingly recognized by the global scientific community as a vital resource for modern conservation. Indigenous and local practices offer unique insights into ecosystem dynamics, species behavior, and sustainable harvesting. By integrating TEK with modern science, conservationists can develop more effective and culturally appropriate strategies for climate change adaptation and biodiversity protection.

184. (1) It is static and has not evolved or adapted over the centuries.
Traditional Ecological Knowledge is deeply embedded in culture and often uses holistic ecosystem approaches, a fact recognized by international treaties like the Nagoya Protocol.

NODIA

CHAPTER 08

Agriculture, Horticulture, Forestry and Animal Husbandry Rajasthan

1. Match the Agro-climatic Zones of Rajasthan in List I with their corresponding characteristics in List II and select the correct answer using the codes given below:
List I: Agro-climatic Zones of Rajasthan
A. Arid Western Plain
B. Irrigated North Western Plain
C. Transitional Plain of Luni Basin
D. Sub-humid Southern Plain
List II: Characteristics
i. High canal irrigation density
ii. Lowest average annual rainfall
iii. Red and black soil predominant
iv. Inland drainage features
(1) A-i, B-ii, C-iii, D-iv
(2) A-ii, B-i, C-iv, D-iii
(3) A-ii, B-iv, C-i, D-iii
(4) A-iv, B-i, C-ii, D-iii
(5) Question not attempted

2. The following question consists of two statements, one labeled as Assertion (A) and the other as Reason (R). Examine these two statements carefully and select the correct answer from the codes given below:
Assertion (A): Dryland farming is extensively practiced in the western districts of Rajasthan.
Reason (R): The western region receives annual rainfall well below 500 mm and lacks widespread perennial surface water sources.
(1) Both A and R are true and R is the correct explanation of A.
(2) Both A and R are true but R is not the correct explanation of A.
(3) A is true but R is false.
(4) A is false but R is true.
(5) Question not attempted

3. Which of the following statements best describes the primary challenge of semi-arid agricultural geography in Rajasthan?
(1) Excessive soil moisture leading to waterlogging and salinity.
(2) Presence of excessive heavy metals in the soil naturally inhibiting plant growth.
(3) High reliance on groundwater resulting in rapid aquifer depletion.
(4) Heavy soil erosion due to dense river networks.
(5) Question not attempted

4. Identify the incorrect statement regarding the agricultural geography of Rajasthan.
(1) The Aravalli range acts as a climatic divide influencing rainfall distribution.
(2) The southeastern plateau region generally receives higher rainfall than the western plains.
(3) Wind erosion is a significant threat to soil fertility in the arid western districts.
(4) The entire state of Rajasthan falls under a single agro-climatic zone.
(5) Question not attempted

5. In the context of arid agriculture in Rajasthan, which of the following is an effective moisture conservation technique?
(1) Flood irrigation
(2) Deep summer ploughing followed by leaving the soil bare
(3) Contour bunding and mulching
(4) Continuous intensive cropping without fallow periods
(5) Question not attempted

6. Which agro-climatic zone of Rajasthan encompasses the districts of Jaisalmer, Barmer, and Bikaner?
(1) Transitional Plain of Inland Drainage
(2) Hyper Arid Partial Irrigated Zone
(3) Semi-Arid Eastern Plain
(4) Humid Southern Plain

Downloaded from www.pdf.tube

(5) Question not attempted

7. The following question consists of two statements. Read both statements and select the correct option:
Statement I: Salinity and alkalinity are common problems in the soils of arid regions.
Statement II: High evaporation rates draw dissolved salts to the soil surface.
(1) Both Statement I and Statement II are correct.
(2) Both Statement I and Statement II are incorrect.
(3) Statement I is correct, but Statement II is incorrect.
(4) Statement I is incorrect, but Statement II is correct.
(5) Question not attempted

8. The practice of cultivating crops in regions receiving less than 750 mm of annual rainfall without supplementary irrigation is strictly defined as:
(1) Dry farming
(2) Rainfed farming
(3) Dryland farming
(4) Irrigated farming
(5) Question not attempted

9. Identify the odd one out among the following challenges faced by farmers in the arid plains of Rajasthan.
(1) Frequent occurrences of agricultural drought
(2) High diurnal temperature variation
(3) Siltation of perennial rivers
(4) Low soil organic carbon content
(5) Question not attempted

10. The phenomenon of desertification in Rajasthan is primarily accelerated by which of the following anthropogenic factors?
(1) Overgrazing by livestock
(2) Promotion of agroforestry
(3) Construction of rainwater harvesting structures
(4) Use of drip irrigation systems
(5) Question not attempted

11. Which of the following drought-resistant crop varieties is commonly cultivated in the arid regions of Rajasthan for grain and fodder?
(1) Basmati Rice varieties
(2) Hybrid Maize cultivars
(3) Industrial Jute fiber
(4) Pearl Millet (Bajra)
(5) Question not attempted

12. Moth bean (Vigna aconitifolia) is extensively grown in Rajasthan because:
(1) It requires high amounts of constant standing water.
(2) It is drought-tolerant and forms a dense soil cover.
(3) It thrives exclusively in highly saline soil types.
(4) It is a winter season crop requiring heavy frost.
(5) Question not attempted

NODIA

13. Consider the following statements regarding drought-resistant crop varieties suited for Rajasthan:
I. 'Khejri' is widely intercropped with Bajra to maintain soil fertility.
II. Guar (Cluster bean) requires high rainfall for optimal gum production.
III. 'Pratap' is a widely adopted drought-tolerant variety of Maize in southern Rajasthan.
Which of the above statement(s) is/are correct?
(1) I and II only
(2) I and III only
(3) II and III only
(4) I, II and III
(5) Question not attempted

14. Which among the following is a high-yielding, drought-resistant variety of Wheat suitable for limited irrigation conditions in Rajasthan?
(1) Pusa Basmati
(2) Sharbati Sonora
(3) Sujata
(4) Raj 3077
(5) Question not attempted

15. Consider the following statements about crop adaptation in Rajasthan:
I. Sorghum (Jowar) has an extensive root system to draw moisture from deep soil layers.

II. Castor is cultivated as a drought-resistant cash crop.
III. Barley exhibits higher tolerance to salinity compared to wheat.
IV. Gram (Chickpea) is predominantly grown as a Kharif crop in arid zones.
V. Sesame (Til) is a drought-tolerant oilseed crop grown in Rajasthan.

Which of the above statement(s) is/are correct?
(1) I, II, III, and V
(2) I, III, IV, and V
(3) II, III, IV, and V
(4) I, II, III, IV, and V
(5) Question not attempted

16. The development of 'early maturing' crop varieties is an essential strategy in Rajasthan's agriculture primarily to:
(1) Maximize vegetative growth
(2) Escape terminal drought conditions
(3) Increase the water requirement of the crop
(4) Synchronize harvesting with the monsoon peak
(5) Question not attempted

17. Identify the correct pair of crop and its characteristic suited for Rajasthan.
(1) Mustard - High water requirement, sensitive to frost
(2) Isabgol - Winter crop, low water requirement, cash crop
(3) Groundnut - Cultivated solely in hyper-arid zones without irrigation
(4) Cotton - Grown entirely in rainfed areas of Jaisalmer
(5) Question not attempted

18. The Central Arid Zone Research Institute (CAZRI) has played a crucial role in developing varieties for which of the following crops?
(1) Bajra, Moth, and Guar
(2) Rubber and Tea
(3) Coffee and Cardamom
(4) Jute and Mesta
(5) Question not attempted

19. What is the primary advantage of cultivating Millets (Shree Anna) in Rajasthan?
(1) They are highly susceptible to pests, requiring intensive chemical use.
(2) They require highly fertile, waterlogged soils.
(3) They are climate-resilient, requiring minimal water and inputs.
(4) They have a very long duration of maturity, keeping the land occupied.
(5) Question not attempted

20. Which of the following is not a characteristic of drought-resistant crop varieties?
(1) Deep root systems
(2) Reduced leaf area
(3) Thick cuticle layer
(4) High transpiration
(5) Question not attempted

21. Integrated Pest Management (IPM) advocates for which of the following approaches?
(1) Total eradication of all insects using broad-spectrum chemical pesticides.
(2) Exclusive reliance on biological control agents without any use of chemicals.
(3) Use of multiple methods to keep pests below economic injury levels.
(4) Routine preventive spraying based on fixed calendar dates rather than need.
(5) Question not attempted

22. In the context of IPM, what does the term 'Economic Threshold Level' (ETL) signify?
(1) The minimum market price of a specific crop required to ensure farming remains profitable.
(2) Pest density where control must prevent populations from reaching injury levels.
(3) The maximum permissible concentration of chemical pesticide allowed per hectare of land.
(4) The total cumulative financial loss incurred due to pest damage across an entire region.
(5) Question not attempted

23. Consider the following statements regarding the tools of Integrated Pest Management:
I. Trichogramma is a parasitoid wasp used for the biological control of lepidopteran pests.
II. Pheromone traps are used to attract and monitor male insects.
III. Neem Seed Kernel Extract (NSKE) acts as a botanical biopesticide.
IV. Crop rotation is considered a chemical method of pest control.

Click Here to Buy book on Amazon

(3) Open field terrace
(4) Polyhouse
(5) Question not attempted

42. In Rajasthan, the primary rationale for adopting polyhouse farming is to:
(1) Protecting high-value crops from pests and extreme weather
(2) Exposing the internal crops to natural desert wind patterns
(3) Cultivating traditional cereal crops on a massive regional scale
(4) Encouraging the natural proliferation of local weed species
(5) Question not attempted

43. What is the fundamental principle behind the 'greenhouse effect' utilized in protected cultivation?
(1) Reflecting incoming solar radiation to keep the structure cold.
(2) Utilizing green-colored glass to filter out ultraviolet rays exclusively.
(3) Allowing heat to escape the structure rapidly during the night.
(4) Trapping thermal radiation inside to maintain a warm microclimate.
(5) Question not attempted

44. Which of the following crops is most commonly grown under greenhouse conditions in Rajasthan due to its high commercial value?
(1) Pearl Millet
(2) Rose and Capsicum
(3) Sorghum Grain
(4) Mustard Seeds
(5) Question not attempted

45. Arrange the following steps of setting up and operating a typical polyhouse in the correct sequence:
A. Erection of the GI pipe framework and cladding with UV-stabilized film
B. Site selection and land leveling
C. Installation of drip irrigation and fogging systems
D. Bed preparation, fumigation, and planting
Which of the following represents the correct sequence?
(1) B, A, C, D
(2) A, B, D, C
(3) B, C, A, D
(4) A, D, B, C
(5) Question not attempted

46. Identify the correct statement regarding shade net houses.
(1) Providing complete protection against heavy seasonal rainfall.
(2) Constructing the structure using solid reinforced glass panels.
(3) They maintain a much higher internal temperature than standard polyhouses.
(4) Reducing sunlight intensity and heat stress on plants.
(5) Question not attempted

47. Which technology is integrated into naturally ventilated polyhouses in Rajasthan to manage extremely high summer temperatures?
(1) Fan and pad cooling systems
(2) Diesel heaters
(3) High-pressure sodium lamps
(4) Solid concrete roofing
(5) Question not attempted

48. Soil solarization in protected cultivation is an eco-friendly method used primarily for:
(1) Significantly increasing soil acidity for specialized crops.
(2) Using solar heat to disinfect soil from pathogens and weeds.
(3) Generating solar electricity to power the polyhouse fans.
(4) Accelerating the drying process of harvested grain crops.
(5) Question not attempted

49. The National Horticulture Mission (NHM) provides subsidies for protected cultivation. This intervention aims to:
(1) Discourage farmers from growing fruits and vegetables.
(2) Enhance the productivity and quality of horticultural crops per unit area.
(3) Promote traditional rainfed subsistence farming.
(4) Shift the focus entirely to forestry.
(5) Question not attempted

50. What is a primary limitation or challenge of polyhouse farming in Rajasthan?

NODIA

(5) Question not attempted

33. What does Variable Rate Technology (VRT) allow a farmer to do?
(1) Modify the interest rate on government agricultural loans for precision equipment.
(2) Apply inputs at varying rates across a field based on specific local conditions.
(3) Randomly alter the operational speed of tractors during the initial ploughing phase.
(4) Maintain a constant high flow of irrigation water irrespective of soil moisture levels.
(5) Question not attempted

34. Which of the following is considered a crucial tool for real-time crop health monitoring in precision farming?
(1) Unmanned Aerial Vehicles (Drones)
(2) Diesel-powered water pumps
(3) Manual hand-held sickles
(4) Traditional iron ploughs
(5) Question not attempted

35. Consider the following statements regarding Precision Agriculture in Rajasthan:
I. It helps in managing the acute water scarcity through targeted micro-irrigation.
II. Remote sensing data is utilized to assess soil moisture indices.
III. Soil health cards act as a foundational data source for site-specific nutrient management.
IV. It requires high initial capital investment, which is a barrier for marginal farmers.
V. It advocates for the blind application of universally recommended fertilizer doses.
Which of the above statement(s) is/are correct?
(1) I, II, III, and IV
(2) II, III, IV, and V
(3) I, III, IV, and V
(4) I, II, IV, and V
(5) Question not attempted

36. Identify the most appropriate definition of 'Grid Sampling' in the context of precision agriculture.
(1) Planting seeds in a precise rectangular pattern for specific aesthetic goals.
(2) Analyzing the national power grid to improve levels of rural electrification.
(3) Assessing market demand for various crops across different geographic sectors.
(4) Mapping soil variability by dividing a field and sampling each section.
(5) Question not attempted

37. Which sensor technology is most commonly used in precision agriculture to measure crop health and vigor by analyzing reflected light?
(1) Seismic sensors for earth movements
(2) Acoustic sensors for sound waves
(3) NDVI sensors to analyze reflected light
(4) Magnetic resonance imaging sensors
(5) Question not attempted

38. The implementation of precision agriculture in Rajasthan is directly beneficial for mitigating the effects of:
(1) Maintaining uniform levels of soil fertility
(2) Variability in soil and climate conditions
(3) Overabundance of skilled agricultural labor
(4) Extreme levels of rainfall and flooding
(5) Question not attempted

39. Analyze the following cause and effect statements and select the correct option:
Cause: Precision agriculture utilizes micro-irrigation systems coupled with soil moisture sensors.
Effect: There is a significant increase in the water use efficiency of crops in arid regions.
(1) The Cause is true, and the Effect is the direct result of the Cause.
(2) The Cause is false, but the Effect is true.
(3) Both the Cause and the Effect are false.
(4) The Cause is true, but the Effect is completely unrelated to the Cause.
(5) Question not attempted

NODIA

40. Yield monitors attached to combine harvesters provide data to create:
(1) Yield maps
(2) Cadastral maps
(3) Topographic sheets
(4) Weather forecasting charts
(5) Question not attempted

41. Protected cultivation encompasses farming practices carried out in enclosed structures. Which of the following is not a type of protected cultivation structure?
(1) Greenhouse
(2) Shade net house

carbon markets and encouraged countries to find cost-effective ways to meet targets.

193. (2) Setting emission limits and allowing trade of surplus allowances.
Cap and trade is a regulatory system designed to reduce pollution in the atmosphere. A government sets a "cap" or limit on the total amount of greenhouse gases that can be emitted. Companies receive or buy emission allowances. If a company emits less than its limit, it can "trade" its surplus allowances to other companies that exceed their emission limits.

194. (1) Under an emissions trading system, companies are never allowed to buy credits from the market; they must reduce emissions internally to zero.
Both carbon taxes and emissions trading systems aim to reduce greenhouse gases by putting a price on carbon. A tax provides price certainty, while a cap and trade system provides certainty on the total emissions limit. The claim that companies in an emissions trading system cannot buy credits is incorrect; the very essence of the system is the ability to trade.

195. (3) Reductions must be real and not possible without carbon credit revenue.
Additionality is a fundamental requirement for any carbon offset project to be considered valid. It means that the emission reductions achieved by the project must be "additional" to what would have happened anyway under a business-as-usual scenario. Specifically, the project must demonstrate that the reduction in carbon was only possible because of the financial support from selling carbon credits.

196. (1) Statement I is correct, and Statement II is incorrect.
The Clean Development Mechanism was established under the Kyoto Protocol to allow developed nations to meet their emission reduction targets by investing in sustainable projects in developing countries. Contrary to the second statement, developing countries like India were fully eligible and became major participants in CDM projects. These initiatives provided a way for India to attract green investment.

197. (3) 1 metric tonne of carbon dioxide or equivalent gases.
In international carbon markets, the standard unit of measurement for a carbon credit is one metric tonne of carbon dioxide. This unit can also represent an equivalent amount of other greenhouse gases, such as methane or nitrous oxide, based on their global warming potential. This standardization allows for the trading of credits across different sectors and projects around the world.

198. (2) Industries relocating to countries with weak regulations due to local policy.
Carbon leakage occurs when a country's strict climate policies lead to an increase in total emissions elsewhere. This happens if energy-intensive industries relocate to nations with weaker environmental regulations or lower carbon costs to maintain their competitiveness. Consequently, while local emissions might decrease, global emissions remain the same or increase, undermining the overall effectiveness of international efforts to combat change.

199. (4) Increasing the production of single-use plastics to reduce timber use.
Carbon credits are generated through projects that either reduce existing emissions or sequester carbon from the atmosphere. Examples include renewable energy installations, afforestation, and landfill methane capture. However, increasing the production of single-use plastics is an environmentally harmful practice that relies on fossil fuels and generates significant waste. Such activities do not reduce greenhouse gases and are ineligible for credits.

200. (1) Compliance markets are mandatory; voluntary markets are for non-mandatory offsets.
Compliance carbon markets are established by governments to meet mandatory emission reduction targets, such as those under the Kyoto Protocol. Participants are legally required to account for their emissions. In contrast, voluntary carbon markets allow individuals and corporations to purchase offsets on their own initiative to mitigate their carbon footprint, even when they are not legally obligated to do so.

Downloaded from www.pdf.tube

(1) High initial investment and technical expertise required.
(2) Consistently low yields compared to open field methods.
(3) Strict requirement for highly fertile, deep black soils.
(4) Inability to grow vegetables during the off-season months.
(5) Question not attempted

51. Horticulture in Rajasthan focuses on the cultivation of:
(1) Cultivation of various cereal and pulse food crops only
(2) Production of timber-yielding forest tree species only
(3) Fruits, vegetables, flowers, spices, and aromatic plants
(4) Commercial growth of marine algae and various seaweeds
(5) Question not attempted

52. Which district in Rajasthan is famously known as the "Orange City" or "Nagpur of Rajasthan" due to its extensive Mandarin (Kinnow/Orange) cultivation?
(1) Sriganganagar
(2) Bikaner
(3) Udaipur
(4) Jhalawar
(5) Question not attempted

53. Kinnow, a high-yielding mandarin hybrid, is extensively grown in which agro-climatic zone of Rajasthan?
(1) Arid Western Plain (Jaisalmer and Barmer)
(2) Sub-humid Southern Plain (Banswara and Dungarpur)
(3) Irrigated North Western Plain (Sriganganagar)
(4) Semi-Arid Eastern Plain (Jaipur and Ajmer)
(5) Question not attempted

54. Identify the incorrect pair regarding fruit cultivation hubs in Rajasthan:
(1) Guava - Sawai Madhopur
(2) Mango - Jaisalmer
(3) Custard Apple (Sitaphal) - Rajsamand and Chittorgarh
(4) Pomegranate - Barmer and Jalore
(5) Question not attempted

55. Consider the following statements about floriculture in Rajasthan:
I. Pushkar (Ajmer) is a major center for rose cultivation.
II. Marigold is cultivated extensively due to its hardiness and demand in local markets.
III. Floriculture does not require micro-irrigation as it thrives on flood irrigation.
Which of the above statement(s) is/are correct?
(1) I and II only
(2) II and III only
(3) I and III only
(4) I, II and III
(5) Question not attempted

56. Which of the following vegetables is widely cultivated in the sandy soils of Rajasthan's arid regions during the summer/Zaid season?
(1) Watermelon and Muskmelon
(2) Winter Cauliflower
(3) European Cabbage
(4) Garden Turnips
(5) Question not attempted

NODIA

57. Arrange the following fruit crops in decreasing order of their general drought tolerance (highest tolerance to lowest tolerance):
A. Date Palm
B. Ber (Jujube)
C. Mango
D. Banana
Which of the following represents the correct order?
(1) B, A, C, D
(2) A, B, C, D
(3) B, A, D, C
(4) C, D, A, B
(5) Question not attempted

58. The 'Centre of Excellence for Citrus' in Rajasthan, established with Israeli collaboration, is located at:
(1) Nanta (Kota)
(2) Bassi (Jaipur)
(3) Sagarkho (Jaisalmer)
(4) Jhalrapatan (Jhalawar)
(5) Question not attempted

59. Which of the following is an objective of promoting horticulture in Rajasthan?
(1) Increasing the reliance on staple grain

need for any chemical fertilizers.
Which of the above statement(s) is/are correct?
(1) I and II only
(2) II and III only
(3) I and III only
(4) I, II and III
(5) Question not attempted

96. Which fast-growing exotic tree species was extensively planted in Rajasthan for afforestation and canal bank stabilization, but later criticized for lowering the water table and suppressing local biodiversity?
(1) Neem (Azadirachta indica)
(2) Prosopis juliflora (Vilayati Babool)
(3) Rohida (Tecomella undulata)
(4) Khejri (Prosopis cineraria)
(5) Question not attempted

97. What is the primary function of 'Shelterbelts' planted in the western districts of Rajasthan?
(1) Providing timber resources for the domestic paper industry.
(2) Break wind velocity and check the shifting of sand dunes.
(3) Attracting significantly more rainfall to the desert areas.
(4) To provide aesthetic value to urban areas
(5) Question not attempted

98. Farm forestry, a component of social forestry, involves:
(1) Farmers planting trees on their own farmlands for commercial or household use.
(2) The forest department planting trees on government land exclusively.
(3) Planting trees strictly in urban parks.
(4) Harvesting timber from protected national parks.
(5) Question not attempted

99. Identify the incorrect statement regarding afforestation efforts in Rajasthan.
(1) The Aravalli Afforestation Project aimed to restore the degraded ecological balance of the Aravalli hills.
(2) Afforestation increases the carbon sequestration capacity of the state.
(3) Afforestation in Rajasthan solely relies on highly water-intensive species like Teak and Sal.
(4) Joint Forest Management (JFM) involves local communities in afforestation and forest protection.
(5) Question not attempted

100. The Indira Gandhi Canal Project (IGNP) area has witnessed extensive afforestation. What is the main ecological benefit observed here?
(1) Creation of a natural habitat for various marine life forms.
(2) Complete elimination of all soil salinity in the canal area.
(3) Transformation of the region into a dense tropical rainforest
(4) Stabilization of sand dunes and creating a micro-climate.
(5) Question not attempted

101. Match the items in List I with those in List II and select the correct answer using the codes given below:
List I: Forest Type in Rajasthan
A. Tropical Dry Deciduous Forest
B. Tropical Thorn Forest
C. Sub-tropical Broad-leaved Hill Forest
D. Dry Teak Forest
List II: Dominant Tree Species/Region
i. Khejri, Babool, Phog (Western Arid Region)
ii. Teak, Tendu (Banswara, Dungarpur)
iii. Dhokda (Anogeissus pendula) (Aravalli Region)
iv. Mango, Jamun, Gurjan (Mount Abu)
(1) A-i, B-iii, C-ii, D-iv
(2) A-ii, B-iv, C-i, D-iii
(3) A-iii, B-i, C-iv, D-ii
(4) A-iv, B-ii, C-iii, D-i
(5) Question not attempted

102. The following question consists of two statements, one labeled as Assertion (A) and the other as Reason (R). Examine these two statements carefully and select the correct answer from the codes given below:
Assertion (A): Rajasthan has a highly uneven distribution of forest cover.
Reason (R): The climatic and edaphic conditions vary drastically, from the hyper-arid western desert to the sub-humid southeastern plateau and Aravalli ranges.
(1) Both A and R are true and R is the correct explanation of A.

Click Here to Buy book on Amazon

(1) To increase the nutritional value of the fruit
(2) To permanently alter the fruit's color
(3) To accelerate the ripening process
(4) To reduce moisture loss and extend shelf life
(5) Question not attempted

69. 'Khejri' (Prosopis cineraria) produces pods which are a rich source of protein and are consumed as a vegetable in Rajasthan. What are these pods locally known as?
(1) Kumati
(2) Ker
(3) Sangri
(4) Gunda
(5) Question not attempted

70. The traditional dish 'Panchkuta' of Rajasthan, which reflects arid horticulture and foraging, comprises which of the following ingredients?
(1) Potato, Onion, Tomato, Garlic, Ginger
(2) Ker, Sangri, Kumati, Amchur, Goonda
(3) Apple, Banana, Grape, Orange, Papaya
(4) Wheat, Maize, Bajra, Jowar, Barley
(5) Question not attempted

71. Rajasthan has significant potential for cultivating Medicinal and Aromatic Plants (MAPs). Which of the following is a highly valued medicinal plant grown extensively in western Rajasthan for its laxative properties?
(1) Vanilla
(2) Saffron
(3) Cinchona
(4) Senna (Sonamukhi)
(5) Question not attempted

72. The following question consists of two statements, one labeled as Assertion (A) and the other as Reason (R). Examine these two statements carefully and select the correct answer from the codes given below:
Assertion (A): Isabgol (Psyllium) is a major medicinal crop cultivated in the Jalore and Barmer districts of Rajasthan.
Reason (R): Isabgol requires heavily waterlogged soils and high humidity throughout its growth cycle.
(1) Both A and R are true and R is the correct explanation of A.
(2) Both A and R are true but R is not the correct explanation of A.
(3) A is true but R is false.
(4) A is false but R is true.
(5) Question not attempted

73. Ashwagandha (Withania somnifera), widely cultivated in the Hadoti region of Rajasthan, is primarily valued for which plant part?
(1) Leaves
(2) Flowers
(3) Roots
(4) Bark
(5) Question not attempted

74. Which of the following aromatic plants is cultivated in Rajasthan primarily for extracting essential oils used in perfumery and cosmetics?
(1) Lemongrass
(2) Neem
(3) Aloe vera
(4) Guggal
(5) Question not attempted

NODIA

75. Consider the following statements regarding Medicinal and Aromatic Plants (MAPs) in Rajasthan:
I. Aloe vera cultivation thrives in arid and semi-arid conditions due to its succulent nature.
II. Guggal (Commiphora wightii) is an important medicinal plant native to the arid tracts, valued for its resin.
III. Safed Musli is grown as a kharif crop and requires well-drained loamy soils.
IV. The processing of Isabgol involves the separation of the seed husk, which holds the primary medicinal value.
Which of the above statement(s) is/are correct?
(1) I, II, and III only
(2) II, III, and IV only
(3) I, II, III, and IV
(4) I, III, and IV only
(5) Question not attempted

76. Identify the correct pair of medicinal plant and its primary use:
(1) Senna - Expectorant
(2) Aloe vera - Cosmetics and skin care
(3) Safed Musli - Anti-malarial drug
(4) Tulsi - Source of biodiesel
(5) Question not attempted

forests under JFM.
(3) Members of the local community and forest officials jointly form the management committee.
(4) Communities are entitled to minor forest produce and a share of the timber revenue upon maturity.
(5) Question not attempted

130. The integration of community knowledge and modern silviculture under JFM results in:
(1) Sustainable forest management and livelihoods
(2) Rapid and uncontrolled deforestation of the region
(3) Significant loss of the existing regional biodiversity
(4) Increased incidences of forest fires
(5) Question not attempted

131. Match the items in List I with those in List II and select the correct answer using the codes given below:
List I: Cattle Breed
A. Rathi
B. Tharparkar
C. Nagori
D. Gir (Renda/Ajmera)
List II: Characteristics/Origin Region
i. Excellent draft breed, origin Nagaur
ii. High milk yielder, native to Ajmer-Bhilwara tract
iii. White/light grey, origin near Indo-Pak border, dual purpose
iv. Good milk yielder, brown with white spots, Bikaner-Ganganagar region
(1) A-i, B-ii, C-iii, D-iv
(2) A-iii, B-iv, C-ii, D-i
(3) A-iv, B-iii, C-i, D-ii
(4) A-iv, B-ii, C-i, D-iii
(5) Question not attempted

132. The following question consists of two statements, one labeled as Assertion (A) and the other as Reason (R). Examine these two statements carefully and select the correct answer from the codes given below:
Assertion (A): The Rathi cattle breed is highly preferred by pastoralists in the arid regions of northwestern Rajasthan.
Reason (R): Rathi cattle have low milk yield but are the most powerful draft animals for heavy plowing.
(1) Both A and R are true and R is the correct explanation of A.
(2) Both A and R are true but R is not the correct explanation of A.
(3) A is true but R is false.
(4) A is false but R is true.
(5) Question not attempted

133. Which indigenous cattle breed of Rajasthan is globally renowned for its high milk production and is characterized by a prominent convex forehead and long, pendulous ears?
(1) Kankrej
(2) Nagori
(3) Gir
(4) Malvi
(5) Question not attempted

134. The Nagori breed of cattle is primarily classified as a:
(1) Milch breed
(2) Draft (draught) breed
(3) Dual-purpose breed
(4) Meat breed
(5) Question not attempted

135. Which cattle breed is native to the southwestern districts of Rajasthan (Jalore, Barmer, Sirohi) and is known for its heavy body, lyre-shaped horns, and fast "Sawai Chal" gait?
(1) Hariana
(2) Tharparkar
(3) Mewati
(4) Kankrej
(5) Question not attempted

136. The Tharparkar breed is highly valued in the desert ecosystem because:
(1) Heat-resilient, disease-resistant, and good milker on sparse pasture.
(2) Requiring high-protein stall-feeding and various concentrates.
(3) It produces wool of superior quality.
(4) An exotic breed variety that matures at an extremely fast rate.
(5) Question not attempted

Downloaded from www.pdf.tube

(3) Organic Nutmeg
(4) Dry Cinnamon
(5) Question not attempted

87. Coriander (Dhaniya) cultivation is predominantly concentrated in the southeastern districts of Rajasthan. What type of soil in this region supports its cultivation?
(1) Sandy desert soil types
(2) Saline and alkaline soils
(3) Red loamy soil varieties
(4) Heavy black soils (Vertisols)
(5) Question not attempted

88. Which weed is a major biological constraint and parasitic threat to cumin cultivation in Rajasthan?
(1) Plantago (Zeeri)
(2) Striga
(3) Orobanche (Broomrape)
(4) Cuscuta (Dodder)
(5) Question not attempted

89. What is the economic significance of cultivating seed spices like cumin, coriander, and fenugreek in Rajasthan?
(1) Primarily used as a major source of fodder for local livestock.
(2) Having a very long gestation period of over five years to yield.
(3) Short-duration cash crops with high returns under water scarcity.
(4) Heavily subsidized for the generation of industrial bio-ethanol.
(5) Question not attempted

90. Analyze the following cause and effect statements and select the correct option:
Cause: Unseasonal rainfall and cloudy weather during the flowering and seed formation stage of Cumin.
Effect: Severe outbreak of Alternaria blight and aphid infestation, leading to huge yield losses.
(1) The Cause is true, and the Effect is a direct result of the Cause.
(2) The Cause is false, but the Effect is true.
(3) Both Cause and Effect are false.
(4) The Cause is true, but it has no relation to the Effect.
(5) Question not attempted

91. Afforestation through social forestry in Rajasthan primarily aims to:
(1) Establish commercial timber plantations for the export market.
(2) Relocate forest-dwelling tribal communities to urban centers.
(3) Clear existing forests to create more agricultural land space.
(4) Plant trees on community lands to meet local fuel and fodder needs.
(5) Question not attempted

92. Which of the following best defines 'Agroforestry'?
(1) Growing agricultural crops exclusively inside a modern greenhouse.
(2) Integrating trees and shrubs into farming for economic and social benefits.
(3) Cultivating agricultural crops in deeply forested national park areas.
(4) Replacing all food crops with commercial timber trees for profit.
(5) Question not attempted

93. In the arid zones of Rajasthan, which traditional agroforestry system is most prevalent and ecologically sustainable?
(1) Shifting cultivation (Jhumming) in hilly terrain.
(2) Intensive monoculture of exotic Eucalyptus trees.
(3) Khejri-based silvi-pastoral and agri-silvicultural systems
(4) Mangrove plantations
(5) Question not attempted

NODIA

94. The cultivation of crops between rows of planted trees is an agroforestry practice known as:
(1) Windbreaks
(2) Shelterbelts
(3) Aqua-forestry
(4) Alley cropping
(5) Question not attempted

95. Consider the following statements regarding the benefits of agroforestry in Rajasthan:
I. Tree canopies reduce wind velocity, thereby minimizing wind erosion.
II. Leaf litter from trees enhances soil organic carbon and nutrient recycling.
III. Agroforestry completely eliminates the

113. Rohida (Tecomella undulata) is famous for its beautiful flowers and is designated as the:
(1) State Tree of Rajasthan
(2) State Flower of Rajasthan
(3) National Flower of India
(4) State Heritage Plant
(5) Question not attempted

114. The wood of the Rohida tree is highly valued and often referred to as the:
(1) Marwar Teak
(2) Desert Mahogany
(3) Aravalli Pine
(4) Sandalwood of the West
(5) Question not attempted

115. Consider the following statements regarding the ecological role of desert vegetation (Khejri, Rohida, Phog):
I. They have extensive and deep root systems to tap underground moisture.
II. They play a critical role in stabilizing sand dunes.
III. Their leaf structures are broad and soft to maximize transpiration.
IV. They provide critical habitat and sustenance for desert fauna like the Chinkara.
Which of the above statement(s) is/are correct?
(1) I, II, and III
(2) I, II, and IV
(3) II, III, and IV
(4) I, III, and IV
(5) Question not attempted

116. Phog (Calligonum polygonoides) is a critical desert shrub primarily known for its efficiency in:
(1) Commercial production of desert fruits
(2) Heavy timber extraction for furniture
(3) Producing natural rubber for industry
(4) Sand dune stabilization and fuel/fodder
(5) Question not attempted

117. Arrange the following root adaptations of desert ecosystem plants (like Khejri) in sequence from structural adaptation to ecological consequence:
A. Minimal competition with shallow-rooted surface crops (like Bajra)
B. Successful intercropping and sustained agroforestry
C. Deep taproot system reaching deep phreatic zones
D. Extraction of groundwater during severe surface droughts
Which of the following represents the correct sequence?
(1) C, D, A, B
(2) A, B, C, D
(3) C, A, D, B
(4) D, C, B, A
(5) Question not attempted

118. Which grass species, endemic to the Thar Desert (specifically Jaisalmer), is highly nutritious for livestock and plays a key role in preventing soil erosion?
(1) Elephant grass
(2) Sewan grass
(3) Bamboo
(4) Lemongrass
(5) Question not attempted

119. A major environmental threat to the survival of the Khejri tree in recent years has been identified as:
(1) Excessive rainfall causing widespread root rot.
(2) Major depletion of atmospheric carbon dioxide.
(3) Uncontrollable forest fires in the deep desert.
(4) Infestation by root borers and parasitic fungi.
(5) Question not attempted

120. Identify the odd one out among the flora of the desert ecosystem.
(1) Mangrove
(2) Khejri
(3) Rohida
(4) Ker
(5) Question not attempted

121. Van Mahotsav, meaning the "Festival of Trees," was initiated in India to create mass awareness about forest conservation. In which month is it predominantly celebrated across the country, including Rajasthan?
(1) First week of January
(2) First week of October
(3) First week of July
(4) First week of March

Click Here to Buy book on Amazon

(2) Both A and R are true but R is not the correct explanation of A.
(3) A is true but R is false.
(4) A is false but R is true.
(5) Question not attempted

103. Which tree species constitutes the maximum forest cover in Rajasthan, dominating the dry deciduous forests of the Aravalli ranges?
(1) Teak (Tectona grandis)
(2) Sal (Shorea robusta)
(3) Pine (Pinus roxburghii)
(4) Dhok or Dhokda (Anogeissus pendula)
(5) Question not attempted

104. Legally, forests in Rajasthan are classified into three categories. Which of the following is NOT one of these legal categories?
(1) Commercial Plantations
(2) Reserved Forests
(3) Protected Forests
(4) Unclassed Forests
(5) Question not attempted

105. In which legal category of forests in Rajasthan are all human activities (like grazing and timber collection) strictly prohibited unless specifically permitted?
(1) Protected Forests
(2) Unclassed Forests
(3) Reserved Forests
(4) Community Reserves
(5) Question not attempted

106. Which district in Rajasthan has the maximum geographical area under forest cover?
(1) Udaipur
(2) Churu
(3) Jodhpur
(4) Bikaner
(5) Question not attempted

107. Which district in Rajasthan records the minimum percentage of forest cover relative to its geographical area?
(1) Pratapgarh
(2) Alwar
(3) Karauli
(4) Churu
(5) Question not attempted

108. Sub-tropical broad-leaved hill forests, representing a unique micro-climate with species like natural orchids and wild roses, are restricted to which area of Rajasthan?
(1) Desert National Park
(2) Mount Abu region
(3) Keoladeo National Park
(4) Sambhar Lake environs
(5) Question not attempted

109. Identify the incorrect statement regarding the Dry Teak Forests of Rajasthan.
(1) They are predominantly found in the southern districts like Banswara, Dungarpur, and Pratapgarh.
(2) They thrive in areas receiving average annual rainfall between 75 to 110 cm.
(3) Teak trees grow to heights comparable to tropical rainforests.
(4) Forests are highly susceptible to damage from ground fires.
(5) Question not attempted

110. The 'Babul' (Acacia nilotica) and 'Khejri' (Prosopis cineraria) dominate which type of forest in Rajasthan?
(1) Tropical Dry Evergreen
(2) Tropical Moist Deciduous
(3) Montane Sub-tropical
(4) Tropical Thorn Forest
(5) Question not attempted

111. The Khejri tree (Prosopis cineraria) is deeply revered in Rajasthan and holds the status of:
(1) State Tree
(2) State Flower
(3) State Animal
(4) State Bird
(5) Question not attempted

112. Why is Khejri considered the "Kalpavriksha of the Thar Desert"?
(1) It provides massive timber primarily used for heavy ship-building.
(2) Every part of the tree is useful while it enriches soil fertility.
(3) It produces large edible fruits that are similar to common mangoes.
(4) It only grows near perennial rivers and provides year-round water.
(5) Question not attempted

Downloaded from www.pdf.tube

77. The over-exploitation and unscientific tapping of which native medicinal plant in Rajasthan has led to its placement in the threatened/ endangered category?
(1) Khejri (Prosopis cineraria)
(2) Rohida (Tecomella undulata)
(3) Guggal (Commiphora wightii)
(4) Ashwagandha (Withania somnifera)
(5) Question not attempted

78. Which district is known for having a dedicated medicinal plant mandi (market), specifically prominent for Ashwagandha trade?
(1) Jaisalmer
(2) Bikaner
(3) Sikar
(4) Jhalawar
(5) Question not attempted

79. Mehendi (Henna), an aromatic and cosmetic plant, is most famously cultivated and traded in which town of Rajasthan?
(1) Sojat (Pali)
(2) Bhinmal (Jalore)
(3) Phalodi (Jodhpur)
(4) Nathdwara (Rajsamand)
(5) Question not attempted

80. The primary advantage of integrating Medicinal and Aromatic Plants into traditional farming systems in Rajasthan is:
(1) Requiring significantly more water than traditional cereals.
(2) Higher economic returns and avoided by grazing animals.
(3) Acting as excellent green manure crops for the soil.
(4) Reducing the organic carbon content of the local soil.
(5) Question not attempted

81. Rajasthan is a leading producer of seed spices in India. Which region of Rajasthan is prominently known for spice cultivation?
(1) Mewar and southern Rajasthan region
(2) Hadoti region and Jodhpur-Nagaur
(3) Shekhawati and northern districts
(4) Vagad and tribal border region
(5) Question not attempted

NODIA

82. Which of the following seed spices constitutes a major agricultural export from Rajasthan?
(1) Cumin (Jeera)
(2) Black Pepper
(3) Cardamom
(4) Clove
(5) Question not attempted

83. Identify the correct statement regarding Cumin (Jeera) cultivation in Rajasthan.
(1) It is a Kharif crop requiring heavy rainfall.
(2) It requires highly acidic soils for optimal growth.
(3) Sensitive to frost and diseases like blight.
(4) Propagated strictly through stem cutting methods.
(5) Question not attempted

84. The National Research Centre on Seed Spices (NRCSS) is located in which district of Rajasthan?
(1) Jaipur
(2) Jodhpur
(3) Kota
(4) Ajmer (Tabiji)
(5) Question not attempted

85. Match the items in List I with those in List II and select the correct answer using the codes given below:
List I: Spice
A. Cumin (Jeera)
B. Coriander (Dhaniya)
C. Fenugreek (Methi)
D. Fennel (Saunf)
List II: Prominent Cultivating District/Region
i. Jalore and Barmer
ii. Baran and Kota
iii. Nagaur
iv. Sirohi and Tonk
(1) A-ii, B-i, C-iv, D-iii
(2) A-i, B-iii, C-ii, D-iv
(3) A-i, B-ii, C-iii, D-iv
(4) A-iii, B-ii, C-i, D-iv
(5) Question not attempted

86. Nagaur district is famous across India for producing a specific, highly fragrant variety of which spice?
(1) Yellow Turmeric
(2) Fenugreek (Kasuri Methi)

(5) Question not attempted

122. The historic Khejarli movement in Rajasthan, a precursor to modern community forest management, was led by:
(1) Amrita Devi Bishnoi
(2) Sunderlal Bahuguna
(3) Medha Patkar
(4) Rajendra Singh
(5) Question not attempted

123. The Bishnoi community of Rajasthan is globally renowned for its fundamental religious tenets that mandate:
(1) The practice of shifting cultivation
(2) The exclusive use of timber for building houses
(3) The hunting of wild animals for sustenance
(4) The protection of trees and wildlife
(5) Question not attempted

124. Under Community Forest Management (CFM) and Joint Forest Management (JFM) in Rajasthan, Village Forest Protection and Management Committees (VFPMCs) are formed. Their primary objective is:
(1) Transferring forest land ownership to large private corporations.
(2) Protect and share benefits of degraded forests with communities.
(3) Clearing forests for the establishment of new village settlements.
(4) To collect taxes from passing timber trucks.
(5) Question not attempted

125. Consider the following statements about Van Mahotsav and Community Forestry in Rajasthan:
I. Van Mahotsav aims to encourage citizen participation in planting and protecting trees.
II. 'Orans' are sacred groves managed by local communities where cutting trees is traditionally prohibited.
III. The State Government offers the 'Amrita Devi Bishnoi Smriti Award' for outstanding contribution to wildlife and forest protection.
IV. Joint Forest Management operates solely on a penalty-based approach without any benefit-sharing mechanism.
V. Community forestry helps in meeting the local demand for minor forest produce, reducing pressure on reserved forests.
Which of the above statement(s) is/are correct?
(1) I, II, III, and V
(2) I, III, IV, and V
(3) II, III, IV, and V
(4) I, II, III, IV, and V
(5) Question not attempted

126. What does the term 'Oran' signify in the context of Rajasthan's environment?
(1) A specific type of shifting sand dune found in the western desert.
(2) A large-scale man-made canal for providing agricultural irrigation.
(3) An indigenous traditional method of harvesting seasonal rainwater.
(4) A sacred grove dedicated to a deity, conserved by community rules.
(5) Question not attempted

127. Community forest management essentially relies on which of the following approaches?
(1) Decentralized, participatory approach involving stakeholders
(2) Top-down, exclusionary policing by the forest department
(3) Privatization of natural resources
(4) Complete abandonment of forest lands
(5) Question not attempted

128. During Van Mahotsav in Rajasthan, priority is given to planting:
(1) Exotic timber species imported from the tropics.
(2) Indigenous species adapted to local conditions.
(3) Water-intensive crops such as various Paddy types.
(4) Genetically modified cash crops for high profits.
(5) Question not attempted

129. Identify the incorrect statement regarding the institutional framework of Joint Forest Management (JFM) in Rajasthan.
(1) It operates under the guidelines issued by the central and state governments.
(2) The communities are granted complete ownership and land titles of the reserved

Click Here to Buy book on Amazon

imports.
(2) Maximizing water usage through flood irrigation.
(3) Replacing natural forests with fruit orchards.
(4) Diversify agriculture and increase farmer income.
(5) Question not attempted

60. The process of removing unproductive or diseased branches from fruit trees to enhance yield and fruit quality is known as:
(1) Mulching
(2) Pruning
(3) Grafting
(4) Staking
(5) Question not attempted

61. Arid horticulture focuses on fruit crops that can survive under high temperatures and limited moisture. Which of the following is the most iconic arid fruit crop of Rajasthan?
(1) Hill Apple
(2) Pineapple
(3) Ber (Jujube)
(4) Litchi Nut
(5) Question not attempted

62. Which vegetative propagation method is most commonly commercially used for multiplying superior varieties of Ber in Rajasthan?
(1) Seed propagation
(2) Air layering
(3) Tissue culture only
(4) T-budding (Shield budding)
(5) Question not attempted

63. Pomegranate (Punica granatum) cultivation has seen massive expansion in districts like Barmer and Jalore primarily due to:
(1) Drip irrigation and hardy varieties like 'Bhagwa'
(2) Consistently high annual rainfall in the region.
(3) The natural occurrence of deep black cotton soils.
(4) Ban on growing traditional crops in these districts.
(5) Question not attempted

NODIA

64. The Date Palm (Phoenix dactylifera) requires a specific climate for successful fruit maturation. Which phrase best describes this requirement?
(1) Cool and humid summer seasons with extremely high rainfall.
(2) Hot, dry summers with minimal rain during fruit ripening.
(3) Continuous frosty winters and moderate, mild summer periods.
(4) Constant cloud cover throughout the year.
(5) Question not attempted

65. Match the items in List I with those in List II and select the correct answer using the codes given below:
List I: Arid Fruit Crop
A. Ber
B. Pomegranate
C. Date Palm
D. Aonla (Indian Gooseberry)
List II: Popular Variety
i. Bhagwa
ii. Gola
iii. Krishna (NA-5)
iv. Halawy
(1) A-i, B-ii, C-iii, D-iv
(2) A-ii, B-i, C-iv, D-iii
(3) A-ii, B-iv, C-i, D-iii
(4) A-iv, B-iii, C-ii, D-i
(5) Question not attempted

66. The Centre of Excellence for Date Palm in Rajasthan is located at:
(1) Sagrabhojka (Jaisalmer)
(2) Jhalrapatan (Jhalawar)
(3) Bassi (Jaipur District)
(4) Devda (Sirohi Region)
(5) Question not attempted

67. Which of the following techniques is essential in date palm cultivation because the plant is dioecious?
(1) Emasculation
(2) Self-pollination
(3) Hand pollination
(4) Parthenocarpy
(5) Question not attempted

68. What is the primary purpose of applying wax coating to arid fruits like pomegranate before marketing?

137. Which state-level fair in Rajasthan is predominantly famous for the trading of Nagori cattle?
(1) Pushkar Fair
(2) Chandrabhaga Fair (Jhalawar)
(3) Ramdev Cattle Fair (Nagaur)
(4) Gogamedi Fair (Hanumangarh)
(5) Question not attempted

138. Identify the correct statement regarding cattle rearing in Rajasthan.
(1) Cattle rearing acts as a primary insurance against frequent crop failures due to drought.
(2) Rajasthan has the highest cattle population in India.
(3) Only exotic crossbreeds are reared in Rajasthan due to the failure of indigenous breeds.
(4) Animal husbandry contributes negligibly to the state's agricultural GDP.
(5) Question not attempted

139. The 'Mewati' or 'Kosi' cattle breed is a dual-purpose breed primarily found in which region of Rajasthan?
(1) Udaipur and Rajsamand
(2) Jaisalmer and Bikaner
(3) Kota and Bundi
(4) Alwar and Bharatpur
(5) Question not attempted

140. Which disease is a major viral threat to the cattle population in Rajasthan, causing high fever, mouth ulcers, and foot lesions, often managed through widespread vaccination campaigns?
(1) Anthrax
(2) Foot and Mouth Disease (FMD)
(3) Black Quarter
(4) Mastitis
(5) Question not attempted

141. The camel has been officially declared as the State Animal (Livestock category) of Rajasthan in which year?
(1) 2005
(2) 2018
(3) 2014
(4) 1981
(5) Question not attempted

142. The National Research Centre on Camel (NRCC), a premier institute for camel research and development, is located at:
(1) Jodhpur
(2) Jaisalmer
(3) Barmer
(4) Bikaner (Jorbeer)
(5) Question not attempted

143. Which breed of camel in Rajasthan is most famous for its riding speed, agility, and participation in the BSF's camel contingent?
(1) Jaisalmeri
(2) Bikaneri
(3) Mewari
(4) Jalori
(5) Question not attempted

144. The 'Bikaneri' breed of camel is easily identifiable by which distinguishing physical feature?
(1) Extremely light body weight and very slender skeletal build.
(2) A prominent depression above the eyes and heavy build.
(3) A complete and total absence of any visible hump structure.
(4) Pure white coat color exclusively
(5) Question not attempted

145. Match the items in List I with those in List II and select the correct answer using the codes given below:
List I: Camel Breed
A. Bikaneri
B. Jaisalmeri
C. Mewari
D. Gomath
List II: Primary Utility/Characteristic
i. Adapted to hilly terrain, prominent lower lip
ii. Famous for swift riding and agility
iii. Heavy draft purpose, most populous breed
iv. Famous for riding, found near Phalodi region
(1) A-iii, B-ii, C-i, D-iv
(2) A-iii, B-ii, C-i, D-iv
(3) A-iii, B-iv, C-i, D-ii
(4) A-ii, B-i, C-iv, D-iii
(5) Question not attempted

Downloaded from www.pdf.tube

Which of the above statement(s) is/are correct?
(1) I and II only
(2) II and III only
(3) I and III only
(4) I, II and III
(5) Question not attempted

196. Consider the following statements about the 'Mukhyamantri Kamdhenu Bima Yojana':
I. It provides insurance cover to milch animals (cows and buffaloes).
II. A maximum of two milch animals per family are insured.
III. It completely covers the cost of building new dairy sheds.
IV. It provides a financial cover up to ₹40,000 per animal in case of sudden death.
Which of the above statement(s) is/are correct?
(1) I, II, and III
(2) I, II, and IV
(3) II, III, and IV
(4) I, III, and IV
(5) Question not attempted

197. Consider the following statements regarding the promotion of micro-irrigation in Rajasthan:
I. Subsidies are provided for installing drip and sprinkler irrigation systems.
II. Small and marginal farmers receive a higher percentage of subsidy compared to large farmers.
III. It significantly increases water use efficiency in the arid and semi-arid tracts.
IV. The scheme strictly mandates the use of imported equipment only.
V. It plays a critical role in bringing more area under horticulture crops.
Which of the above statement(s) is/are correct?
(1) I, II, III, and V
(2) I, III, IV, and V
(3) II, III, IV, and V
(4) I, II, IV, and V
(5) Question not attempted

198. Arrange the following steps involved in a farmer availing benefits under the PM Fasal Bima Yojana (PMFBY) in the correct sequence:
A. Crop loss due to localized calamity or post-harvest loss
B. Intimation of loss to the insurance company or agriculture department within 72 hours
C. Enrollment and payment of nominal premium before the cutoff date
D. Survey, assessment of crop loss, and direct claim settlement into the bank account
Which of the following represents the correct sequence?
(1) C, A, B, D
(2) A, C, B, D
(3) C, B, A, D
(4) B, C, A, D
(5) Question not attempted

NODIA

199. To promote organic farming, which of the following dedicated schemes is being implemented?
(1) Pradhan Mantri Matsya Sampada Yojana (PMMSY)
(2) National Food Security Mission (NFSM)
(3) Rashtriya Krishi Vikas Yojana (RKVY)
(4) Paramparagat Krishi Vikas Yojana (PKVY)
(5) Question not attempted

200. What is the core objective of the 'Mukhyamantri Beej Swavalamban Yojana' in Rajasthan?
(1) Farmer production of quality seeds for self-reliance.
(2) Enforcing a complete ban on the use of farm-saved seeds.
(3) Importing high-yielding genetically modified seeds.
(4) To provide free chemical fertilizers along with seeds.
(5) Question not attempted

www.nodia.in

STUDYING FROM PDFs?

THINK AGAIN.

If you are studying only from PDFs,
you are wasting valuable time.

Research shows that learning from

PRINTED BOOKS has up to

4× HIGHER RETENTION

than studying from screens.

PRINT BOOK = BETTER MEMORY

PDF = LOWER RETENTION

Those who study from **PRINTED BOOKS**
move **AHEAD.**

Others are left **BEHIND**
in competition.

In competitive exams,
being average is not enough.

STAY ONE STEP AHEAD.

II. Rajasthan produces more than 30% of India's total wool.
III. The 'Barbari' goat breed is native to the arid desert districts of Jaisalmer and requires extensive free-range grazing.

Which of the above statement(s) is/are correct?
(1) I and II only
(2) II and III only
(3) I and III only
(4) I, II and III
(5) Question not attempted

156. The 'Pugal' breed of sheep, recognized by its black face with light brown stripes above the eyes, is native to which district?
(1) Udaipur
(2) Bikaner
(3) Jhalawar
(4) Karauli
(5) Question not attempted

157. Which goat breed of Rajasthan is highly prolific, often giving birth to twins or triplets, and is suited for stall feeding?
(1) Sirohi
(2) Jakhrana
(3) Barbari
(4) Marwari
(5) Question not attempted

158. Sheep and goat rearing in Rajasthan is primarily characterized by which type of management system?
(1) Intensive zero-grazing indoor system
(2) Indoor automated housing facilities
(3) Hydroponic grazing
(4) Extensive and nomadic pastoralism
(5) Question not attempted

159. What is the primary purpose of cross-breeding indigenous sheep breeds with exotic breeds like Rambouillet and Merino in Rajasthan?
(1) Improve wool quantity and fineness
(2) Increasing total carcass meat yield
(3) Making them suitable for heavy plowing
(4) To change their coat color to black
(5) Question not attempted

160. Which disease is highly fatal to sheep in Rajasthan, primarily characterized by sudden death, often linked to overeating lush pasture or grains (Pulpy Kidney Disease)?
(1) Mastitis
(2) Enterotoxemia
(3) Brucellosis
(4) Coccidiosis
(5) Question not attempted

161. Match the items in List I with those in List II and select the correct answer using the codes given below:
List I: Dairy Organization/Brand
A. RCDF
B. Saras
C. NDDB
D. Milk Union
List II: Description
i. Apex state-level dairy cooperative federation in Rajasthan
ii. Brand name under which RCDF markets its dairy products
iii. National organization supporting dairy development
iv. District-level cooperative entity managing milk procurement
(1) A-ii, B-i, C-iv, D-iii
(2) A-i, B-ii, C-iii, D-iv
(3) A-i, B-iii, C-ii, D-iv
(4) A-iv, B-ii, C-iii, D-i
(5) Question not attempted

162. The following question consists of two statements, one labeled as Assertion (A) and the other as Reason (R). Examine these two statements carefully and select the correct answer from the codes given below:
Assertion (A): The cooperative dairy sector in Rajasthan follows a three-tier "Anand Pattern" structure.
Reason (R): The structure consists of Village Dairy Cooperative Societies, District Milk Unions, and a State Level Federation to eliminate middlemen and ensure fair prices to farmers.
(1) Both A and R are true and R is the correct explanation of A.
(2) Both A and R are true but R is not the correct explanation of A.
(3) A is true but R is false.
(4) A is false but R is true.
(5) Question not attempted

Click Here to Buy book on Amazon

(3) Complete restriction of drinking water during the day
(4) Evaporative cooling systems and proper ventilation.
(5) Question not attempted

181. Match the items in List I with those in List II and select the correct answer using the codes given below:
List I: Important Water Body
A. Jaisamand Lake
B. Ramgarh Dam
C. Bisalpur Dam
D. Mahi Bajaj Sagar Dam
List II: District/Significance for Fisheries
i. Tonk (Major reservoir for commercial inland fisheries)
ii. Udaipur (Second largest artificial lake, significant tribal fishery)
iii. Jaipur (Historic fishing, currently largely dry/seasonal)
iv. Banswara (Large reservoir supporting substantial fish production)
(1) A-i, B-ii, C-iii, D-iv
(2) A-ii, B-i, C-iv, D-iii
(3) A-ii, B-iii, C-i, D-iv
(4) A-iv, B-iii, C-ii, D-i
(5) Question not attempted

182. Fisheries in Rajasthan are entirely restricted to:
(1) Marine fisheries
(2) Inland freshwater fisheries
(3) Brackish water aquaculture
(4) Deep-sea trawling
(5) Question not attempted

183. Which group of fishes constitutes the majority of the commercial catch from Rajasthan's water bodies?
(1) Commercial Tuna catch
(2) Saltwater Mackerel
(3) Coldwater Trout fish
(4) Rohu, Catla, and Mrigal
(5) Question not attempted

184. The 'National Scheme of Welfare of Fishermen' in Rajasthan primarily provides support for:
(1) Housing, insurance, and relief during the closed season.
(2) Purchasing large mechanized marine trawlers for deep seas.
(3) Exporting fish exclusively to various European markets.
(4) Converting agricultural land into salt pans.
(5) Question not attempted

185. Consider the following statements about fisheries in Rajasthan:
I. The southern and southeastern districts (Udaipur, Banswara, Dungarpur, Bhilwara) have the highest potential for reservoir fisheries.
II. Fish seed production is a major constraint; hence, hatcheries have been established.
III. Mahseer, a famous sport fish, is found in the freshwaters of southern Rajasthan.
IV. Ornamental fish farming is slowly gaining popularity as an entrepreneurial activity.
V. Fishing operations in large reservoirs are completely unregulated and open to anyone without permits.
Which of the above statement(s) is/are correct?
(1) I, II, III, and IV
(2) II, III, IV, and V
(3) I, III, IV, and V
(4) I, II, IV, and V
(5) Question not attempted

186. Which fast-growing, exotic fish species was introduced for aquaculture but has caused ecological concerns by competing with indigenous carps in Rajasthan's water bodies?
(1) Tilapia and African Catfish
(2) Native Indian Catla
(3) Native Indian Rohu
(4) Native Indian Mrigal
(5) Question not attempted

187. The practice of rearing two or more compatible species of fish together in the same pond to fully utilize all ecological niches is called:
(1) Intensive Monoculture
(2) Floating Cage Culture
(3) Pen Culture
(4) Composite Fish Culture
(5) Question not attempted

188. In Rajasthan, the fishing season in natural water bodies and reservoirs is officially closed for a specific period every year. What is the biological reason for this?
(1) Peak winter season when fish hibernate in

NODIA

farms for export markets.
(2) Empower rural poor for supplementary income and nutrition.
(3) Replace all local poultry breeds with exotic broiler strains.
(4) Promote the commercial rearing of ostriches.
(5) Question not attempted

173. Which indigenous breed of poultry in Rajasthan is famous for its jet-black flesh, which is believed to have medicinal properties and high protein content?
(1) White Leghorn
(2) Rhode Island Red
(3) Kadaknath
(4) Aseel
(5) Question not attempted

174. A major constraint facing the commercial poultry sector in Rajasthan's arid regions during summer is:
(1) Frostbite
(2) Excessive humidity leading to various fungal skin infections.
(3) Total unavailability of sandy soil for natural dust bathing.
(4) Heat stress causing high mortality and low egg production.
(5) Question not attempted

175. Consider the following statements regarding Poultry Farming in Rajasthan:
I. Commercial layer farming is highly concentrated around Ajmer due to favorable infrastructure and market linkages.
II. White Leghorn is widely used in commercial layer farms for high egg production.
III. Ranikhet disease (Newcastle disease) is a negligible threat and requires no vaccination in Rajasthan.
IV. Contract farming is increasingly becoming popular in the broiler sector.
Which of the above statement(s) is/are correct?
(1) I, II, and III
(2) I, II, and IV
(3) II, III, and IV
(4) I, III, and IV
(5) Question not attempted

176. Which of the following is an improved, dual-purpose (meat and egg) breed promoted for backyard poultry in rural Rajasthan?
(1) Broiler Cobb 500
(2) Pratapdhan
(3) Emu
(4) Pekin Duck
(5) Question not attempted

177. Arrange the following steps of commercial broiler farming in the correct chronological order:
A. Pre-heating the brooding area (Brooding)
B. Cleaning, disinfection, and laying of fresh litter
C. Harvesting the birds for the market (at ~35-40 days)
D. Arrival of Day-Old Chicks (DOCs)
Which of the following represents the correct sequence?
(1) B, A, D, C
(2) A, B, D, C
(3) D, A, B, C
(4) B, D, A, C
(5) Question not attempted

178. The term 'Layer' in poultry farming specifically refers to:
(1) Birds raised specifically for egg production
(2) Birds raised exclusively for meat production
(3) The bedding material spread on the floor of the poultry house
(4) A specific tier of cages in a battery system
(5) Question not attempted

179. What constitutes the largest recurring cost in running a commercial poultry farm in Rajasthan?
(1) Veterinary medicines
(2) Industrial electricity costs
(3) Poultry feed costs
(4) Utility water charges
(5) Question not attempted

180. To mitigate the effects of the harsh summer climate on poultry in Rajasthan, farmers extensively use:
(1) Implementing open-air roosting on local desert trees.
(2) Dark painting of the roof to absorb external heat energy.

NODIA

9. (3) Siltation of perennial rivers
Farmers in the arid plains of Rajasthan face challenges like frequent droughts, extreme temperature variations, and low soil organic carbon. However, the siltation of perennial rivers is not a characteristic challenge because the region largely lacks perennial river systems. Most water bodies in these arid districts are seasonal or ephemeral. Therefore, river siltation does not represent a primary concern.

10. (1) Overgrazing by livestock
Desertification in Rajasthan is significantly accelerated by anthropogenic factors such as overgrazing by livestock. When the number of animals exceeds the carrying capacity of the land, the protective vegetative cover is destroyed. This exposes the soil to wind erosion and reduces its water-holding capacity. Other factors like deforestation and unscientific land use further exacerbate the degradation of ecosystems.

11. (4) Pearl Millet (Bajra)
Pearl Millet, locally known as Bajra, is the most common drought-resistant crop cultivated in the arid regions of Rajasthan. It is well-adapted to sandy soils and requires minimal water to reach maturity. This crop provides essential food grains for human consumption and valuable fodder for livestock. Its resilience makes it a staple for farmers residing in desert districts.

12. (2) It is drought-tolerant and forms a dense soil cover.
Moth bean is extensively grown in Rajasthan because of its remarkable drought tolerance and ability to thrive in poor soils. This pulse crop forms a dense canopy over the soil, which helps in reducing moisture evaporation and checking wind erosion. It is a vital source of protein in arid regions and requires very little rainfall for a harvest.

13. (2) I and III only
In Rajasthan's agricultural landscape, Khejri trees are traditionally intercropped with Bajra to enhance soil fertility through nitrogen fixation. Additionally, 'Pratap' is a well-known drought-tolerant variety of Maize specifically suited for the southern districts. However, Guar or cluster bean is actually highly drought-tolerant and does not require high rainfall. Therefore, only the first and third statements are correct.

14. (4) Raj 3077
Raj 3077 is a high-yielding wheat variety specifically developed for conditions where irrigation water is limited. It is widely adopted by farmers in Rajasthan due to its ability to provide stable yields even under moisture stress. This variety exhibits good resistance to common diseases and is well-suited for the climatic conditions of the state. It represents a significant advancement.

15. (1) I, II, III, and V
Various crops in Rajasthan exhibit specific adaptations to survive water scarcity. Sorghum has deep roots for moisture extraction, while Castor and Sesame are hardy oilseeds. Barley shows better salinity tolerance than wheat, making it suitable for certain arid tracts. However, Gram is a Rabi season crop, not a Kharif crop. Thus, the statements regarding Sorghum, Castor, Barley, and Sesame are correct.

16. (2) Escape terminal drought conditions
Developing early maturing crop varieties is a critical strategy in Rajasthan to ensure agricultural success. These varieties complete their life cycle quickly, allowing them to escape terminal drought that often occurs when the monsoon retreats prematurely. By maturing before soil moisture is completely exhausted, these crops provide a reliable harvest. This adaptation reduces the risk of total crop failure.

17. (2) Isabgol - Winter crop, low water requirement, cash crop
Isabgol is a significant winter crop in Rajasthan, particularly in the western districts. It is characterized by its low water requirement and high commercial value as a medicinal cash crop. Other options provided are incorrect because Mustard is sensitive to frost and Cotton requires more water than typically available in rainfed Jaisalmer. Isabgol remains a vital component of the economy.

18. (1) Bajra, Moth, and Guar
The Central Arid Zone Research Institute has been instrumental in developing improved varieties of crops suited for desert environments.

Downloaded from www.pdf.tube

the deep mud.
(2) Monsoon is the natural breeding and spawning season.
(3) Strict religious requirement observed statewide yearly.
(4) To allow the water to be used exclusively for irrigation during the summer.
(5) Question not attempted

189. Which modern aquaculture technology is being promoted in Rajasthan to maximize fish production in existing reservoirs by rearing fish in enclosed mesh structures?
(1) Raceway culture
(2) Biofloc technology
(3) Cage culture
(4) Aquaponics
(5) Question not attempted

190. Saline water aquaculture in Rajasthan, particularly the farming of Whiteleg shrimp (Litopenaeus vannamei), has been successfully experimented in the inland saline groundwater tracts of which district?
(1) Banswara
(2) Jhalawar
(3) Udaipur
(4) Churu
(5) Question not attempted

191. Match the items in List I with those in List II and select the correct answer using the codes given below:
List I: Government Scheme/Initiative
A. Pradhan Mantri Fasal Bima Yojana (PMFBY)
B. Pradhan Mantri Krishi Sinchayee Yojana (PMKSY)
C. National Livestock Mission (NLM)
D. Mukhyamantri Krishak Sathi Yojana
List II: Primary Objective
i. Financial assistance in case of accidental death/injury to farmers during farm operations
ii. Focus on 'Per Drop More Crop' through micro-irrigation
iii. Comprehensive risk cover for crops against non-preventable natural risks
iv. Quantitative and qualitative improvement in livestock, fodder development
(1) A-iii, B-ii, C-iv, D-i
(2) A-i, B-iii, C-ii, D-iv
(3) A-iii, B-iv, C-i, D-ii
(4) A-ii, B-i, C-iv, D-iii
(5) Question not attempted

192. The 'Rajasthan Agricultural Competitiveness Project' (RACP) primarily aims to:
(1) Subsidizing chemical fertilizers heavily for all farmers.
(2) Sustainable and climate-resilient agriculture for higher income.
(3) Procuring all agricultural produce at MSP by the state.
(4) Distribute free tractors to every farmer in the state.
(5) Question not attempted

193. Under the Rajasthan Grameen Aajeevika Vikas Parishad (Raj Rajivika), special emphasis is given to rural women through the promotion of:
(1) Establishing regional heavy industrial manufacturing units.
(2) Self Help Groups (SHGs) for agri-allied activities.
(3) Developing urban software technology development parks.
(4) Deep-sea fishing
(5) Question not attempted

NODIA

194. The 'Soil Health Card Scheme' helps farmers in Rajasthan by:
(1) Nutrient status and recommendations for fertilizer dosages.
(2) Guaranteeing a fixed and high market price for their crops.
(3) Insuring their various livestock types against diseases.
(4) Registering their land records online.
(5) Question not attempted

195. Consider the following statements regarding agricultural initiatives in Rajasthan:
I. The KUSUM scheme promotes the installation of standalone solar agriculture pumps to reduce reliance on diesel.
II. The e-NAM portal facilitates a unified national market for agricultural commodities.
III. Organic farming is strongly discouraged by the state government to ensure maximum yield.

163. The Rajasthan Cooperative Dairy Federation (RCDF) was set up in which year to implement dairy development programs?
(1) 1951
(2) 1991
(3) 1977
(4) 2005
(5) Question not attempted

164. What is the primary socio-economic impact of the village-level milk cooperative societies in Rajasthan?
(1) Marginalizing small and marginal farmers across regions.
(2) Encouraging the large-scale import of foreign milk powder.
(3) They solely focus on the meat industry.
(4) Regular income for households, especially empowering women.
(5) Question not attempted

165. The pricing of raw milk procured from farmers by the cooperative societies in Rajasthan is primarily based on:
(1) The color of the milk
(2) The breed of the cattle alone
(3) FAT and Solid Not Fat (SNF) content
(4) The distance of the village from the dairy plant
(5) Question not attempted

166. Under the Mukhyamantri Dugdh Utpadak Sambal Yojana in Rajasthan, the government provides what kind of support to milk producers supplying to cooperative dairies?
(1) Providing free fodder for all cattle for an entire year.
(2) A direct financial subsidy per liter over procurement price.
(3) Distributing free veterinary medicines to all members.
(4) Compulsory life insurance policies
(5) Question not attempted

167. Identify the incorrect statement regarding dairy development in Rajasthan.
(1) Rajasthan is one of the top milk-producing states in India.
(2) Buffaloes contribute a larger share to the total milk production in the state compared to cows.
(3) The cooperative network provides veterinary first aid and artificial insemination services to its members.
(4) RCDF strictly markets only liquid milk and prohibits the sale of value-added products like ghee and paneer.
(5) Question not attempted

168. Which buffalo breed is the most prominent contributor to the dairy sector in the eastern and south-eastern districts of Rajasthan?
(1) Murrah
(2) Bhadawari
(3) Surti
(4) Mehsana
(5) Question not attempted

169. What role do Bulk Milk Coolers (BMCs) play in the cooperative dairy network of Rajasthan?
(1) Transporting milk over long distances using railway tankers.
(2) Pasteurizing milk directly within the village collection center.
(3) Chilling milk at the village level to maintain quality.
(4) They convert milk into milk powder instantaneously.
(5) Question not attempted

170. Which district of Rajasthan boasts the largest dairy plant in the state, handling massive volumes of milk processing?
(1) Jaipur
(2) Jaisalmer
(3) Pratapgarh
(4) Dungarpur
(5) Question not attempted

171. Poultry farming in Rajasthan is experiencing significant growth. Which district is known as the "Poultry Hub" or the "Egg Basket" of Rajasthan?
(1) Jaipur
(2) Jodhpur
(3) Kota
(4) Ajmer
(5) Question not attempted

172. The primary focus of the 'Backyard Poultry Farming' initiative in Rajasthan is to:
(1) Establish automated commercial layer

Click Here to Buy book on Amazon

ANSWERS

1. (2) A-ii, B-i, C-iv, D-iii
The agro-climatic zones of Rajasthan are categorized based on specific geographical and climatic features. The Arid Western Plain is characterized by the lowest average annual rainfall in the state. In contrast, the Irrigated North Western Plain shows high canal irrigation density. The Luni Basin includes inland drainage features, while the Southern Plain has red and black soil.

2. (1) Both A and R are true and R is the correct explanation of A.
Dryland farming is extensively practiced in western Rajasthan because the region faces severe water scarcity. The annual rainfall in these districts typically remains well below five hundred millimeters. Additionally, the lack of perennial surface water sources makes agricultural activities highly dependent on moisture conservation. These environmental conditions necessitate specific farming techniques to ensure crop survival in arid tracts.

3. (3) High reliance on groundwater resulting in rapid aquifer depletion.
In the semi-arid agricultural geography of Rajasthan, the primary challenge is the heavy dependence on groundwater for irrigation. Due to limited surface water and erratic rainfall, farmers extract large quantities of water from underground sources. This practice leads to a rapid decline in the water table, causing aquifer depletion. Sustaining agricultural productivity under these conditions requires urgent management.

4. (4) The entire state of Rajasthan falls under a single agro-climatic zone.
Rajasthan is a geographically diverse state and is divided into ten distinct agro-climatic zones based on rainfall, temperature, and soil characteristics. Claiming that the entire state falls under a single zone is factually incorrect. The Aravalli range acts as a climatic divide, significantly influencing rainfall distribution. Consequently, different regions exhibit varied agricultural patterns ranging from arid to humid.

5. (3) Contour bunding and mulching
Arid agriculture in Rajasthan relies on effective moisture conservation techniques to combat high evaporation and low rainfall. Contour bunding involves creating barriers along slope lines to reduce runoff and enhance water infiltration. Mulching covers the soil surface with organic or inorganic materials to retain moisture. These practices are essential for sustaining crops in regions where water availability is limited.

6. (2) Hyper Arid Partial Irrigated Zone
The districts of Jaisalmer, Bikaner, and Churu are part of the Hyper Arid Partial Irrigated Zone, also known as Zone One-C. This region experiences extremely low rainfall and high temperatures, representing the core of the Thar Desert. While irrigation facilities have expanded through the Indira Gandhi Canal, large areas remain hyper-arid. This classification highlights the specific climatic challenges.

7. (1) Both Statement I and Statement II are correct.
Salinity and alkalinity are prevalent soil issues in arid regions like western Rajasthan. High evaporation rates exceed precipitation, causing a capillary action that draws dissolved salts from deeper layers to the soil surface. Over time, these salts accumulate, making the soil less productive for standard crops. Understanding this geochemical process is vital for implementing effective soil reclamation and management.

8. (1) Dry farming
Dry farming is specifically defined as the cultivation of crops in regions where the annual rainfall is less than seven hundred and fifty millimeters. In this system, agricultural production occurs without any supplementary irrigation, relying solely on stored soil moisture. This practice is common in the aridest parts of Rajasthan. It differs from dryland farming, which covers higher rainfall.

NODIA

146. Camel milk is increasingly gaining commercial importance in Rajasthan due to its therapeutic properties, especially in managing:
(1) Diabetes management
(2) Tuberculosis treatment
(3) Malaria prevention
(4) Night blindness cure
(5) Question not attempted

147. A traditional, highly ornate art of clipping camel hair to create beautiful geometric and floral patterns on the camel's body is known as:
(1) Bandhej
(2) Camel shearing art
(3) Usta Art
(4) Phad painting
(5) Question not attempted

148. The Raika or Rabari community of Rajasthan is historically associated with:
(1) Commercial marine fishing
(2) Deep mining and quarrying
(3) Traditional textile weaving
(4) Camel breeding and herding
(5) Question not attempted

149. Identify the primary reason for the recent decline in the camel population in Rajasthan.
(1) Drastic increase in natural camel predation by desert tigers.
(2) Mass migration of healthy camels to various southern regions.
(3) Mechanization, shrinking grazing lands, and movement restrictions.
(4) A sudden genetic mutation making them sterile
(5) Question not attempted

150. Which parasitic disease, locally known as "Tibersa" or "Galtia," is the most economically significant and fatal disease affecting camels in Rajasthan?
(1) Rabies
(2) Trypanosomiasis (Surra)
(3) Foot and Mouth Disease
(4) Rinderpest
(5) Question not attempted

151. Match the items in List I with those in List II and select the correct answer using the codes given below:

List I: Sheep Breed of Rajasthan
A. Chokla
B. Magra
C. Marwari
D. Nali

List II: Distinct Characteristic/Region
i. Produces the finest carpet wool, known as "Merino of Rajasthan"
ii. High disease resistance, black face, largest population
iii. Famous for highly lustrous, pure white wool used in carpets (Bikaner region)
iv. Yields yellow-tinged wool, found in Ganganagar and Hanumangarh

(1) A-ii, B-i, C-iv, D-iii
(2) A-i, B-ii, C-iii, D-iv
(3) A-iii, B-i, C-ii, D-iv
(4) A-i, B-iii, C-ii, D-iv
(5) Question not attempted

152. Rajasthan dominates the national landscape in the production of which livestock product?
(1) Wool
(2) Silk
(3) Pork
(4) Marine fish
(5) Question not attempted

153. The Central Sheep and Wool Research Institute (CSWRI) is located at:
(1) Bikaner
(2) Jodhpur
(3) Avikanagar (Malpura, Tonk)
(4) Vallabhnagar (Udaipur)
(5) Question not attempted

154. Which goat breed of Rajasthan, known for its large size, distinct roman nose, and high milk yield, is predominantly found in the Ajmer-Nagaur belt?
(1) Sirohi
(2) Marwari
(3) Jamnapari
(4) Barbari
(5) Question not attempted

155. Consider the following statements regarding sheep and goat rearing in Rajasthan:
I. Goats are often referred to as the "poor man's cow" because they provide nutrition security during droughts.

Downloaded from www.pdf.tube

Their research primarily focuses on hardy crops like Pearl Millet, Moth bean, and Cluster bean. These varieties are engineered to withstand high temperatures and limited water availability. These contributions are fundamental to enhancing food security and agricultural productivity in Rajasthan's zones.

19. (3) They are climate-resilient, requiring minimal water and inputs.
Cultivating Millets, recently popularized as 'Shree Anna', offers several advantages in Rajasthan due to their inherent climate resilience. These crops require significantly less water than paddy or wheat and can thrive in nutrient-poor soils. They are naturally resistant to many pests and diseases, reducing the need for chemical inputs. Their short growing season makes them ideal for agriculture.

20. (4) High transpiration
Drought-resistant crop varieties possess specific physiological traits to conserve water. These include deep root systems to reach underground water, reduced leaf area to minimize water loss, and thick cuticles. High transpiration is not a characteristic of these plants because it would lead to rapid dehydration in arid environments. Instead, these plants often have mechanisms to limit transpiration rates.

21. (3) Use of multiple methods to keep pests below economic injury levels.
Integrated Pest Management is a sustainable approach that utilizes a combination of biological, cultural, physical, and chemical tools. The goal is not total eradication but keeping pest populations below the level where they cause significant economic damage. This method prioritizes environmental safety and minimizes the use of synthetic pesticides. By integrating various strategies, farmers achieve long-term pest control.

22. (2) Pest density where control must prevent populations from reaching injury levels.
In the context of Integrated Pest Management, the Economic Threshold Level represents a specific pest density. At this point, control measures must be initiated to prevent the population from reaching the Economic Injury Level. Monitoring this threshold helps farmers decide when intervention is necessary, avoiding unnecessary pesticide applications. This concept is fundamental for making economically sound and responsible decisions.

23. (1) I, II, and III
Integrated Pest Management involves several tools such as using Trichogramma wasps for biological control and pheromone traps for insect monitoring. Neem Seed Kernel Extract serves as an effective botanical biopesticide. However, crop rotation is a cultural method, not a chemical one. Therefore, the statements describing Trichogramma, pheromone traps, and Neem extracts are correct, while the classification of rotation is incorrect.

24. (1) Deep summer ploughing to expose pupae
Deep summer ploughing is a traditional cultural method used for pest control in Rajasthan. By turning the soil during the hottest months, dormant pupae and larvae of various pests are exposed to extreme heat and predators. This practice naturally reduces the pest load for the upcoming cropping season. It is an eco-friendly technique that minimizes reliance on synthetic sprays.

25. (3) Reduce chemical dependency and mitigate resistance
Integrating biological controls in Rajasthan's agriculture aims to reduce the heavy reliance on synthetic chemical pesticides. Overuse of chemicals often leads to pests developing resistance and causes environmental pollution. By using natural predators, parasitoids, or microbial agents, farmers can manage pests more sustainably. This approach helps maintain ecological balance and ensures the long-term effectiveness of pest management strategies.

26. (1) They leave high levels of toxic residues in the soil and groundwater.
Biopesticides are derived from natural materials such as plants, bacteria, and certain minerals. One of their primary advantages is that they break down quickly and do not leave harmful toxic residues in the soil or groundwater. Therefore, stating that they leave high levels of toxic residues is incorrect. They are generally safer for non-target organisms and sustainable.

NODIA

63. (1) Drip irrigation and hardy varieties like 'Bhagwa'
Pomegranate cultivation has expanded rapidly in Barmer and Jalore due to the adoption of advanced drip irrigation systems. This technology allows for the precise delivery of water to the roots, overcoming the challenges of the arid climate. Furthermore, the introduction of hardy and high-yielding varieties like 'Bhagwa' has made pomegranate a profitable cash crop for desert farmers.

64. (2) Hot, dry summers with minimal rain during fruit ripening.
The Date Palm requires a very specific climate characterized by long, hot summers to ensure successful fruit maturation. Most importantly, the period of fruit ripening must be dry, as even moderate rainfall or high humidity at this stage can ruin the harvest. These conditions are perfectly met in the arid districts of western Rajasthan, making the state a promising region.

65. (2) A-ii, B-i, C-iv, D-iii
In the arid horticulture of Rajasthan, specific fruit crops are associated with popular varieties. The 'Gola' variety is a famous type of Ber, while 'Bhagwa' is a highly valued pomegranate variety. Date palms are often represented by varieties like 'Halawy', and 'Krishna' is a prominent variety of Aonla or Indian gooseberry. Matching these crops with varieties is essential.

66. (1) Sagrabhojka (Jaisalmer)
The Centre of Excellence for Date Palm is located at Sagrabhojka in the Jaisalmer district. This center was established to promote date palm cultivation by providing high-quality tissue-cultured plants and demonstrating modern farm management. Given Jaisalmer's ideal hot and dry climate, the center plays a key role in transforming the desert economy. It serves as a hub for research.

67. (3) Hand pollination
Date palms are dioecious, meaning that male and female flowers are produced on separate trees. For commercial fruit production, natural wind pollination is often insufficient and inefficient. Therefore, hand pollination is an essential technique where pollen from male spathes is manually applied to the female flower clusters. This ensures a high fruit set and uniform crop quality, which are critical.

68. (4) To reduce moisture loss and extend shelf life
Applying a thin coating of food-grade wax to arid fruits like pomegranate and citrus is a standard post-harvest practice. This wax layer acts as a barrier that significantly reduces the rate of transpiration and moisture loss. By preventing the fruit from shriveling, waxing helps in maintaining its freshness and extending its shelf life for long-distance transport. This is vital.

69. (3) Sangri
The pods of the Khejri tree, which is the state tree of Rajasthan, are locally known as Sangri. These green pods are harvested and consumed as a nutritious vegetable, either fresh or dried. Sangri is a rich source of protein and minerals and is a staple ingredient in traditional desert cuisine. Its ability to be preserved makes it an invaluable food resource.

70. (2) Ker, Sangri, Kumati, Amchur, Goonda
Panchkuta is a famous traditional dish of Rajasthan that showcases the biodiversity of the arid ecosystem. It is a mix of five local ingredients: Ker (berries of Capparis decidua), Sangri (pods of Khejri), Kumati (seeds of Acacia senegal), Amchur (dried mango powder), and Goonda (glue berries). This dish reflects the indigenous knowledge of foraging and preserving wild desert produce.

71. (4) Senna (Sonamukhi)
Senna, locally known as Sonamukhi, is a highly valued medicinal plant grown extensively in the arid tracts of western Rajasthan. It is primarily cultivated for its leaves and pods, which contain compounds used in the pharmaceutical industry for their potent laxative properties. Senna is a hardy, drought-tolerant crop that provides a reliable source of income for farmers in difficult regions.

72. (3) A is true but R is false.
Isabgol is indeed a major medicinal crop cultivated in the Jalore and Barmer districts of Rajasthan, contributing significantly to India's export. However, the reason provided is incorrect because Isabgol does not require waterlogged soils. In fact, it is a drought-tolerant crop that

Click Here to Buy book on Amazon

36. (4) Mapping soil variability by dividing a field and sampling each section.
Grid sampling is a technique used in precision agriculture to understand the variability of soil nutrients across a large area. The field is divided into smaller, uniform sections or "grids", and soil samples are collected from each. Analyzing these samples allows farmers to create detailed nutrient maps. This information is essential for applying fertilizers at variable rates, ensuring efficiency.

37. (3) NDVI sensors to analyze reflected light
Normalized Difference Vegetation Index sensors are widely used to measure crop health and vigor. These sensors analyze the way plants reflect different wavelengths of light, particularly near-infrared and red light. Healthy vegetation reflects more near-infrared light and absorbs more red light. By calculating this index, farmers can identify stressed areas in the field and take corrective actions accordingly.

38. (2) Variability in soil and climate conditions
Implementing precision agriculture in Rajasthan is directly beneficial for mitigating the challenges posed by high variability in soil and climate conditions. Since soil fertility and moisture levels can vary significantly even within a single field, uniform farming often leads to wastage or under-performance. Precision techniques allow for site-specific management, ensuring that every part is treated according to requirements.

39. (1) The Cause is true, and the Effect is the direct result of the Cause.
Precision agriculture integrates micro-irrigation systems with soil moisture sensors to ensure that water is applied only when and where it is needed. This targeted approach directly results in a significant increase in water use efficiency. In the arid regions of Rajasthan, where water is a scarce resource, such technological integration is vital for sustainable crop production and viability.

40. (1) Yield maps
Yield monitors are electronic devices attached to combine harvesters that record the amount of grain harvested in real-time. When coupled with GPS data, this information is used to create detailed yield maps. These maps show the variations in productivity across different parts of a field. Farmers can analyze these maps to understand why certain areas underperformed and plan accordingly.

41. (3) Open field terrace
Protected cultivation involves growing crops within structures that allow for the modification of environmental factors. Common structures include greenhouses, shade net houses, and polyhouses. These provide protection from wind, extreme temperatures, and pests. An open field terrace, while a method of soil conservation on slopes, does not provide an enclosed environment. Therefore, it is not a protected cultivation.

42. (1) Protecting high-value crops from pests and extreme weather
The primary reason for adopting polyhouse farming in Rajasthan is to protect high-value crops like capsicum and exotic vegetables from harsh climatic conditions. Polyhouses shield plants from the intense desert sun, hot winds, and occasional frost. Additionally, they create a physical barrier against many insect pests. This controlled environment allows for year-round production of superior-quality produce, which fetches higher prices.

43. (4) Trapping thermal radiation inside to maintain a warm microclimate.
The greenhouse effect in protected cultivation works by allowing short-wave solar radiation to enter through the covering material. Once inside, this energy is absorbed by the plants and re-radiated as long-wave thermal radiation. The structure's cladding traps this heat, preventing it from escaping. This process maintains a warmer internal microclimate, which is essential for plant growth during winter.

44. (2) Rose and Capsicum
Roses and capsicum are among the most commonly grown crops under greenhouse conditions in Rajasthan. These high-value horticultural products require specific temperature and humidity levels to achieve premium quality. By cultivating them in a controlled environment, farmers can ensure consistent yields and better aesthetics. These products are highly demanded in urban markets and for significant export purposes.

Downloaded from www.pdf.tube

survive local environmental constraints while involving communities through management.

100. (4) Stabilization of sand dunes and creating a micro-climate.
The extensive afforestation carried out along the Indira Gandhi Canal has brought significant ecological benefits to the region. The tree plantations have helped in stabilizing shifting sand dunes, preventing them from encroaching on the canal and agricultural lands. Furthermore, the increased green cover has created a more favorable microclimate, reducing wind speeds and increasing humidity. This transformation is a prime example.

101. (3) A-iii, B-i, C-iv, D-ii
Rajasthan's forests are categorized into distinct types based on climate and species. Tropical Dry Deciduous forests are dominated by Dhokda and are common in the Aravalli region. Tropical Thorn forests, featuring Khejri and Babool, are found in the western arid zones. The unique Sub-tropical Broad-leaved Hill forests are restricted to Mount Abu, while Dry Teak forests are prevalent southernly.

102. (1) Both A and R are true and R is the correct explanation of A.
Rajasthan exhibits a highly uneven distribution of forest cover, with the majority concentrated in the southern and eastern parts of the state. This is because the climatic and soil conditions vary drastically across different regions. The hyper-arid west offers very little support for dense forest growth, whereas the sub-humid southeastern plateau and Aravalli ranges provide a more suitable environment.

103. (4) Dhok or Dhokda (Anogeissus pendula)
Dhokda is the most widespread tree species in Rajasthan, constituting a significant portion of the state's forest cover. It is the dominant species in the dry deciduous forests that cover the Aravalli hills. Dhokda is exceptionally hardy and can grow on rocky and hilly terrain with minimal soil and water. Its wood is traditionally valued for its strength and ecosystem role.

104. (1) Commercial Plantations
Legally, the forests in Rajasthan are classified into three distinct categories: Reserved Forests, Protected Forests, and Unclassed Forests. These classifications determine the level of protection and the degree of human activity allowed within them. Commercial Plantations is not a legal category under this classification system, although plantations may exist within the other categories. Understanding these legal divisions is fundamental.

105. (3) Reserved Forests
Reserved forests are the most protected category of forests in Rajasthan. In these areas, all human activities, including livestock grazing, timber collection, and entry, are strictly prohibited unless specific permission is granted by the forest department. This high level of protection aims to conserve the natural habitat, biodiversity, and critical water catchments. They represent core areas of forest conservation.

NODIA

106. (1) Udaipur
Udaipur district consistently records the maximum geographical area under forest cover in Rajasthan. The hilly terrain of the Aravallis and relatively higher rainfall in this region support the growth of dense deciduous and teak forests. The extensive forest cover in Udaipur is vital for the state's ecological balance and provides habitat for diverse wildlife. It stands in sharp contrast westwards.

107. (4) Churu
Churu district is known for having the minimum geographical area under forest cover in Rajasthan. Located in the heart of the arid zone, the district faces extreme temperatures and very low rainfall, which naturally limits forest growth. The landscape is dominated by sand dunes and sparse desert vegetation. This highlights the severe ecological constraints faced.

108. (2) Mount Abu region
Sub-tropical broad-leaved hill forests are a unique forest type found only in the Mount Abu region of Rajasthan. The high altitude of the Aravalli hills here creates a distinct micro-climate with higher rainfall and lower temperatures compared to the surrounding plains. This allows for the growth of diverse species like mango and natural orchids. These forests represent a biodiversity hotspot.

production of high-quality, juicy kinnow fruits statewide.

54. (2) Mango - Jaisalmer
In the horticultural geography of Rajasthan, mangoes are primarily grown in more humid and sub-humid southern districts like Banswara and Udaipur. Jaisalmer is a hyper-arid district where mangoes are not traditionally cultivated on a commercial scale due to extreme heat and lack of water. Other pairs like Guava in Sawai Madhopur and Pomegranate in Barmer are correct representations.

55. (1) I and II only
Pushkar in Ajmer is a world-renowned center for rose cultivation, producing flowers for local use and export. Marigold is another popular flower in Rajasthan due to its hardy nature and steady market demand. However, floriculture greatly benefits from micro-irrigation systems to save water and improve quality, making the third statement incorrect. Thus, only the first two statements are correct.

56. (1) Watermelon and Muskmelon
During the summer or Zaid season, watermelons and muskmelons are widely cultivated in the sandy soils of Rajasthan's arid regions. These crops are well-adapted to high temperatures and the loose soil of riverbeds and desert tracts. They provide a vital source of income for farmers during the lean period between the major harvest seasons. Their high water content is popular.

57. (1) B, A, C, D
Among fruit crops, the Ber (Jujube) exhibits the highest level of drought tolerance, followed closely by the Date Palm. Both are quintessential desert plants adapted to minimal moisture. Mango requires more moderate conditions and regular water, while Banana has very low drought tolerance and requires high amounts of moisture. Therefore, the correct decreasing order is Ber, Date Palm, Mango, and Banana.

58. (1) Nanta (Kota)
The Centre of Excellence for Citrus was established at Nanta in the Kota district through a collaboration with Israel. This facility focuses on developing high-quality citrus saplings and demonstrating advanced cultivation techniques like drip irrigation and canopy management. By introducing superior varieties and modern practices, the center aims to boost the productivity and quality of citrus fruits across Rajasthan.

59. (4) Diversify agriculture and increase farmer income.
The promotion of horticulture in Rajasthan is primarily aimed at diversifying the agricultural base and increasing the income of farmers. High-value crops like fruits, vegetables, and spices often provide better returns per unit of land compared to traditional cereals. Horticulture also creates more employment opportunities in rural areas through processing and marketing. This strategy is essential for profitable farming.

60. (2) Pruning
Pruning is an essential horticultural practice that involves the selective removal of unproductive, overcrowded, or diseased branches from fruit trees. This process helps in improving sunlight penetration and air circulation within the tree canopy. By directing the plant's energy toward healthy and productive branches, pruning significantly enhances the yield and quality of the fruit. Regular pruning is vital for health.

61. (3) Ber (Jujube)
The Ber, or Indian Jujube, is considered the most iconic and resilient fruit crop of the arid zones in Rajasthan. It is remarkably adapted to survive extreme temperatures and prolonged droughts. The tree provides nutritious fruits, valuable fodder for goats, and thorny branches for fencing. Because of its multiple uses and hardiness, the Ber is the king of arid fruits.

62. (4) T-budding (Shield budding)
T-budding, also known as shield budding, is the most common commercial method for propagating superior varieties of Ber in Rajasthan. This vegetative technique involves inserting a bud from a desired high-yielding variety into the rootstock of a hardy local plant. This ensures that the new plant inherits the superior fruit characteristics while maintaining the drought resilience of the native stock.

Click Here to Buy book on Amazon

82. (1) Cumin (Jeera)
Cumin, or Jeera, is one of the most important agricultural exports from Rajasthan. The state accounts for a massive share of the national cumin production. This spice is highly valued in international markets for its quality and essential oil content. Western districts like Jalore and Barmer are famous for their high-quality cumin. Its export contributes significantly to foreign exchange earnings.

83. (3) Sensitive to frost and diseases like blight.
Cumin is a delicate Rabi season crop in Rajasthan that requires careful management. It is highly sensitive to extreme cold and frost, which can severely damage the flowering stage. Additionally, the crop is prone to diseases like Alternaria blight and wilt, especially during cloudy weather. Successful cumin cultivation requires precise weather conditions and timely plant protection measures for a harvest.

84. (4) Ajmer (Tabiji)
The National Research Centre on Seed Spices is located at Tabiji in the Ajmer district. This premier institute focuses on research and development related to various seed spices like cumin, coriander, and fennel. It works on developing high-yielding varieties and standardized production technologies for farmers. The center's location in Ajmer is strategic, given the district's proximity to major spice-growing regions.

85. (3) A-i, B-ii, C-iii, D-iv
Different regions of Rajasthan are specialized in the production of various seed spices. Cumin is a major crop in the Jalore and Barmer districts, while Coriander is predominantly grown in the Hadoti region's Baran and Kota districts. Nagaur is famous for its high-quality Fenugreek, and Fennel is commonly cultivated in the Sirohi and Tonk areas. This regional specialization is traditional.

86. (2) Fenugreek (Kasuri Methi)
Nagaur district is uniquely famous for producing a specific, highly fragrant variety of fenugreek known as 'Kasuri Methi'. Unlike common fenugreek, this variety is prized for its intense aroma and is used primarily as a dried herb in culinary preparations. The dry climate and soil of Nagaur contribute to its superior quality. Kasuri methi is in high demand nationally.

87. (4) Heavy black soils (Vertisols)
Coriander cultivation in southeastern Rajasthan is supported by the presence of heavy black soils, scientifically known as Vertisols. These soils have high water-holding capacity and are rich in nutrients, making them ideal for the Hadoti region's agricultural pattern. The combination of fertile soils and favorable winter climate allows for large-scale commercial production. Rajasthan remains a leading producer of coriander.

88. (1) Plantago (Zeeri)
Plantago, locally known as Zeeri, is a major weed that poses a significant biological constraint to cumin cultivation in Rajasthan. Its seeds are very similar in appearance to cumin, making it difficult to separate during and after harvest. Zeeri competes with the main crop for nutrients and moisture, leading to reduced yields and quality. Managing this weed is a challenge.

89. (3) Short-duration cash crops with high returns under water scarcity.
Cultivating seed spices like cumin and coriander is economically significant for Rajasthan because they are short-duration cash crops. They require relatively less water compared to traditional Rabi crops like wheat, making them ideal for the state's water-scarce environment. These spices fetch high prices in international markets, providing farmers with substantial returns in a short period. They drive rural prosperity.

90. (1) The Cause is true, and the Effect is a direct result of the Cause.
Unseasonal rainfall and cloudy weather during the flowering stage are highly detrimental to the cumin crop. These climatic conditions create a humid environment that promotes the rapid spread of fungal diseases like Alternaria blight. Furthermore, cloudy weather often leads to severe aphid infestations. For a sensitive crop like cumin, these environmental triggers directly result in massive yield losses and quality reduction.

NODIA

thrives in well-drained soils and requires a dry climate, especially during the harvesting stage. The assertion is true.

73. (3) Roots
Ashwagandha, also known as Indian Ginseng, is a vital medicinal plant cultivated in the Hadoti region of Rajasthan. While the whole plant has medicinal properties, it is primarily valued for its thick, fleshy roots. These roots are harvested, dried, and processed into powders or extracts used in medicine to reduce stress and improve vitality. Rajasthan is a significant producer of high-quality roots.

74. (1) Lemongrass
Lemongrass is an aromatic grass cultivated in various parts of Rajasthan for the extraction of its essential oil. This oil is rich in citral and is widely used in the production of perfumes, cosmetics, and soaps. Lemongrass is a perennial crop that can be harvested multiple times a year and is relatively easy to maintain. It offers an excellent opportunity for farmers.

75. (3) I, II, III, and IV
Rajasthan possesses a diverse range of medicinal and aromatic plants. Aloe vera and Guggal are well-adapted to arid conditions, with Guggal being prized for its unique resin. Safed Musli is grown as a profitable Kharif crop in loamy soils. Furthermore, the processing of Isabgol involves separating the husk, which is the primary part used in medicine. All these statements are correct.

76. (2) Aloe vera - Cosmetics and skin care
Aloe vera is widely recognized for its gel-like substance, which is extensively used in the cosmetics and skincare industry. It has soothing and moisturizing properties that make it a common ingredient in lotions and creams. Other options are incorrect as Senna is a laxative, not an expectorant, and Safed Musli is used as a tonic. Aloe vera is highly suitable.

77. (3) Guggal (Commiphora wightii)
Guggal is a native medicinal shrub of Rajasthan valued for its aromatic resin used in treating various ailments. Unfortunately, over-exploitation and unscientific tapping methods to extract the resin have led to a drastic decline in its population. It is now categorized as a threatened or endangered species. Conservation efforts are being made to promote sustainable harvesting and prevent its extinction.

78. (4) Jhalawar
Jhalawar district is known for having a dedicated medicinal plant market or mandi, which is particularly prominent for the trade of Ashwagandha. The region's climate favors the production of high-quality roots, attracting buyers from across the country. The presence of this specialized market provides farmers with a direct platform to sell their produce at competitive prices, encouraging medicinal crop cultivation.

79. (1) Sojat (Pali)
Sojat, a town in the Pali district of Rajasthan, is world-famous for the cultivation and processing of high-quality Henna, locally known as Mehendi. The region's soil and climate are uniquely suited for producing henna with superior dye content. Sojat mehendi is exported to numerous countries and is a significant contributor to the economy. It has received a Geographical Indication tag.

80. (2) Higher economic returns and avoided by grazing animals.
Integrating Medicinal and Aromatic Plants into traditional farming systems offers significant advantages for Rajasthan's farmers. These plants often provide higher economic returns compared to traditional food grains. Furthermore, many medicinal species are naturally avoided by stray cattle and wild grazing animals due to their bitter taste or chemical properties. This reduces the risk of crop damage and lowers protection costs.

81. (2) Hadoti region and Jodhpur-Nagaur
Rajasthan is a major hub for seed spice cultivation in India, with production concentrated in specific regions. The Hadoti region (southeastern Rajasthan) and the Jodhpur-Nagaur belt in the west are the primary areas for spice farming. These regions provide the necessary climatic conditions for crops like cumin, coriander, and fenugreek. Spice cultivation has become a backbone of the regional economy.

Downloaded from www.pdf.tube

27. (4) They are grown to attract pests away from the main cash crop.
Trap crops are a strategic component of Integrated Pest Management. These plants are specifically grown in or around the main field to attract pests away from the primary cash crop. Once the pests congregate on the trap crop, they can be managed more easily or destroyed. This technique reduces the pest pressure on the main harvest and minimizes chemicals.

28. (2) Manual hand-picking and destruction of egg masses
Mechanical pest control involve using physical labor or simple devices to remove and destroy pests. Manual hand-picking of larvae or egg masses is a classic example of this approach. It is particularly effective for managing large, visible pests in small-scale farming. Unlike chemical methods, it has no negative environmental impact and can be carried out without specialized equipment.

29. (3) Used only as a final resort when alternative methods fail.
In an Integrated Pest Management framework, chemical pesticides are not entirely prohibited but are used judiciously. They are considered a final resort, applied only when biological, cultural, and mechanical methods fail to keep pest populations below the economic threshold. When used, the focus is on choosing selective chemicals that cause the least harm to the environment and insects.

30. (4) Neem extract (Azadirachtin)
Neem extract, containing the active compound Azadirachtin, is the most traditionally utilized botanical in Rajasthan for pest control. Farmers have long used neem leaves, seeds, and oil for their potent antifeedant and insect-repellent properties. It is effective against a wide range of agricultural pests while being safe for humans and livestock. This indigenous knowledge aligns with modern sustainability.

31. (1) GPS and GIS technologies
Precision agriculture relies heavily on Global Positioning Systems and Geographic Information Systems. These technologies allow farmers to map their fields with high accuracy and track site-specific variations in soil and crop conditions. By using spatial data, agricultural inputs can be applied more precisely where they are needed. This high-tech approach represents a shift from uniform field management.

32. (2) Optimize returns on inputs while preserving resources and reducing environmental impact.
The primary objective of adopting precision agriculture in Rajasthan is to optimize the use of resources like water, fertilizers, and seeds. By applying the right amount of input at the right time and place, farmers can maximize their returns. This approach also helps in preserving valuable resources and minimizing the environmental degradation caused by over-application. It is particularly relevant.

33. (2) Apply inputs at varying rates across a field based on specific local conditions.
Variable Rate Technology is a cornerstone of precision farming that enables the application of agricultural inputs at different rates. Instead of a uniform application across the entire field, VRT uses sensors and maps to adjust the dosage of water or fertilizers based on the specific needs of different sections. This ensures that every part receives the optimal amount.

34. (1) Unmanned Aerial Vehicles (Drones)
Unmanned Aerial Vehicles, commonly known as drones, have become crucial tools for real-time crop health monitoring. Equipped with specialized sensors and cameras, they can fly over fields to capture high-resolution images. This data helps in identifying areas of nutrient deficiency, water stress, or pest infestation before they become visible. Drones enable timely and targeted interventions in precision farming.

35. (1) I, II, III, and IV
Precision agriculture in Rajasthan utilizes micro-irrigation, remote sensing, and soil health cards for efficient resource management. While these technologies help manage water scarcity and site-specific nutrients, high initial costs remain a barrier for small farmers. It does not advocate for blind fertilizer application; instead, it promotes targeted usage. Thus, the first four statements are correct reflections.

NODIA

91. (4) Plant trees on community lands to meet local fuel and fodder needs.
Afforestation through social forestry in Rajasthan primarily aims to involve local communities in planting trees on non-forest lands. This initiative is designed to meet the immediate needs of the rural population for fuelwood, fodder, and small timber. By creating village forests, it reduces the pressure on existing reserved forests and helps in ecological restoration. Social forestry promotes sustainable land use.

92. (2) Integrating trees and shrubs into farming for economic and social benefits.
Agroforestry is a dynamic land management system that integrates trees and shrubs into crop and livestock production systems. This approach provides multiple benefits, including diversified income sources, improved soil fertility, and enhanced biodiversity. In Rajasthan, agroforestry is essential for creating more resilient farming systems that can withstand climatic extremes. It combines agricultural productivity with environmental conservation for sustainability.

93. (3) Khejri-based silvi-pastoral and agri-silvicultural systems
In the arid zones of Rajasthan, Khejri-based systems are the most traditional and ecologically sustainable form of agroforestry. Khejri trees are naturally scattered across agricultural fields, where they are integrated with crops like pearl millet or maintained as silvi-pastoral systems for livestock grazing. The tree's ability to fix nitrogen and its deep root system make it a perfect companion.

94. (4) Alley cropping
Alley cropping is an agroforestry practice where agricultural crops are grown in the "alleys" formed between rows of planted trees or shrubs. This system allows for the simultaneous production of food crops and woody perennials. The trees can provide various benefits, such as acting as windbreaks, providing mulch, or yielding timber and fruits. Alley cropping maximizes land use efficiency and income.

95. (1) I and II only
Agroforestry offers numerous environmental benefits in Rajasthan. Tree canopies act as windbreaks, significantly reducing wind velocity and soil erosion in arid tracts. Additionally, falling leaves provide organic matter that enhances soil carbon and nutrient recycling. While it improves soil health, it does not completely eliminate the need for fertilizers in intensive systems. Therefore, only the first two statements are correct.

96. (2) Prosopis juliflora (Vilayati Babool)
Prosopis juliflora, locally known as Vilayati Babool, was introduced in Rajasthan for rapid greening and canal stabilization. However, it later faced criticism because it is a highly invasive species that can lower the local water table with its deep roots. It also secretes chemicals that inhibit native vegetation growth, reducing biodiversity. Despite its use as fuelwood, its ecological impact is negative.

97. (2) Break wind velocity and check the shifting of sand dunes.
Shelterbelts are rows of trees and shrubs planted across the wind direction in the western districts of Rajasthan. Their primary ecological function is to break the high velocity of desert winds, which reduces wind erosion and checks the movement of shifting sand dunes. By protecting agricultural fields and infrastructure from sand burial, shelterbelts play a critical role in desert stabilization.

98. (1) Farmers planting trees on their own farmlands for commercial or household use.
Farm forestry is a component of social forestry where individual farmers take the initiative to plant and manage trees on their private agricultural lands. The trees can be grown for various purposes, including providing timber for sale, meeting household fuelwood needs, or yielding fruits. This practice helps farmers diversify their income and provides a buffer against crop failure. It increases cover.

99. (3) Afforestation in Rajasthan solely relies on highly water-intensive species like Teak and Sal.
Afforestation efforts in Rajasthan do not rely on water-intensive species like Teak and Sal because they are unsuitable for the state's arid climate. Instead, projects focus on hardy, indigenous species like Khejri, Rohida, and Neem that are adapted to low water availability. Successful afforestation relies on using species that can

Click Here to Buy book on Amazon

45. (1) B, A, C, D
Setting up a polyhouse begins with proper site selection and land leveling to ensure structural stability and drainage. Next, the galvanized iron pipe framework is erected and covered with UV-stabilized plastic film. Following construction, irrigation and cooling systems like foggers are installed. Finally, the internal beds are prepared, fumigated to kill pathogens, and the crops are planted.

46. (4) Reducing sunlight intensity and heat stress on plants.
Shade net houses are specialized structures designed to protect plants by reducing the intensity of direct sunlight. In Rajasthan, where solar radiation can be extremely high, these houses help in lowering the temperature and preventing heat stress. They are often used for nursery raising and the cultivation of leafy vegetables or ornamental plants. They allow natural air circulation through mesh.

47. (1) Fan and pad cooling systems
Fan and pad cooling systems are frequently integrated into polyhouses in Rajasthan to manage extreme summer heat. This system works on the principle of evaporative cooling. Exhaust fans pull air through wet cellulose pads, significantly lowering the temperature of the air entering the structure. This technology is essential for maintaining an optimal growing environment when external temperatures exceed the survival threshold.

48. (2) Using solar heat to disinfect soil from pathogens and weeds.
Soil solarization is an eco-friendly technique used in protected cultivation to disinfect the soil. Before planting, the moist soil is covered with transparent plastic sheets during the peak summer months. The trapped solar energy raises the soil temperature to levels that kill harmful pathogens, fungi, and weed seeds. This reduces the need for chemical fumigants and helps healthy growth.

49. (2) Enhance the productivity and quality of horticultural crops per unit area.
The National Horticulture Mission provides financial subsidies to encourage farmers to adopt protected cultivation techniques. This initiative aims to improve the productivity and quality of fruits, vegetables, and flowers. By moving away from traditional open-field methods, farmers can achieve higher yields per unit of land. These government interventions are crucial for modernizing Rajasthan's agricultural sector and increasing farmer income.

50. (1) High initial investment and technical expertise required.
Despite its many benefits, polyhouse farming in Rajasthan faces significant challenges, primarily the high initial cost of construction and system installation. Additionally, maintaining the complex microclimate and managing specific pests within the structure requires specialized technical expertise. Marginal farmers often find it difficult to access the necessary capital and training. Overcoming these barriers is essential for wider adoption.

NODIA

51. (3) Fruits, vegetables, flowers, spices, and aromatic plants
Horticulture is a specialized branch of agriculture that focuses on the cultivation of a variety of high-value crops. In Rajasthan, this includes fruits like kinnow and pomegranate, diverse vegetables, various flowers, spices, and aromatic plants. These crops are essential for diversifying the agricultural economy and providing nutritional security. Horticulture typically involves more intensive management practices compared to cereal crops.

52. (4) Jhalawar
Jhalawar district is famously known as the "Nagpur of Rajasthan" because of its extensive mandarin orange cultivation. The region's climate and soil are highly suitable for citrus fruits, making it the leading producer in the state. The widespread orchards contribute significantly to the local economy and have placed Jhalawar on the national map for fruit production.

53. (3) Irrigated North Western Plain (Sriganganagar)
Kinnow, a hybrid mandarin, is extensively grown in the Irrigated North Western Plain, particularly in the Sriganganagar and Hanumangarh districts. The availability of canal irrigation from the Indira Gandhi Canal project has transformed this arid region into a major fruit-producing hub. The cool winters and adequate water supply allow for the

109. (3) Teak trees grow to heights comparable to tropical rainforests.
Dry Teak forests are found in the southern districts of Rajasthan, where they thrive in moderate rainfall conditions. However, due to the seasonal nature of the rain and lower humidity, the teak trees here do not reach the massive heights seen in tropical rainforests. Therefore, the third statement is incorrect. These forests are managed to prevent damage from ground fires.

110. (4) Tropical Thorn Forest
Babul and Khejri are the dominant tree species of the Tropical Thorn Forest type in Rajasthan. These forests are characteristic of the arid and semi-arid regions where rainfall is low and evaporation rates are high. The trees are typically small, with deep roots and thorny structures to reduce water loss. This forest type is vital for desert stabilization and resources.

111. (1) State Tree
The Khejri tree is deeply woven into the cultural and ecological fabric of Rajasthan and holds the official status of the State Tree. It is revered for its resilience and ability to provide food, fodder, and fuel even in the harshest desert conditions. Its significance is celebrated through religious traditions and historic conservation movements. The Khejri is a symbol.

112. (2) Every part of the tree is useful while it enriches soil fertility.
Khejri is hailed as the "Kalpavriksha of the Thar" because of its immense utility in the desert ecosystem. Every part of the tree, from the leaves used as fodder to the pods used as food, is utilized by humans and animals. Furthermore, as a legume, it fixes atmospheric nitrogen, thereby enriching the soil's fertility. Its deep roots ensure survival.

113. (2) State Flower of Rajasthan
Rohida is designated as the State Flower of Rajasthan due to its beautiful and vibrant blossoms that decorate the desert landscape. The flowers are typically orange or yellow and bloom during the spring and early summer. Beyond its aesthetic value, Rohida is an important timber tree that can survive in extremely arid conditions. Its designation highlights unique regional beauty.

NODIA

114. (1) Marwar Teak
The wood of the Rohida tree is exceptionally strong, durable, and has a fine grain, making it highly prized for making high-quality furniture and carvings. Because of these superior qualities, it is often referred to as the "Marwar Teak". Although it is not a true teak species, it serves as the desert's equivalent for timber. It is an economic resource.

115. (2) I, II, and IV
Desert plants like Khejri and Rohida have evolved deep roots to access groundwater and play a vital role in stabilizing sand dunes. They also provide essential habitats for local wildlife such as the Chinkara. However, their leaves are usually small or thorny to minimize water loss, not broad and soft. Therefore, the statements regarding roots, dune stabilization, and habitat are correct.

116. (4) Sand dune stabilization and fuel/fodder
Phog is a quintessential desert shrub that plays a critical role in the Thar ecosystem. Its extensive, sand-binding roots are highly effective in stabilizing shifting sand dunes and preventing wind erosion. The shrub also provides essential fuelwood for desert dwellers and nutritious fodder for camels. Although it does not produce commercial timber, its ecological value makes it a botanical cornerstone.

117. (1) C, D, A, B
The Khejri tree's survival strategy starts with its deep taproot system that reaches far into the phreatic zones. This allows the tree to extract groundwater even during severe surface droughts. Because its roots go so deep, there is minimal competition for moisture with shallow-rooted agricultural crops like Bajra. This unique adaptation enables successful intercropping and the practice of agroforestry.

118. (2) Sewan grass
Sewan grass is a highly nutritious perennial grass endemic to the Thar Desert, particularly the Jaisalmer region. It is exceptionally well-adapted to sandy soils and low rainfall. Sewan provides excellent pasture for livestock and plays a vital role in preventing soil erosion by binding the loose desert sand. Conserving Sewan grasslands is essential for maintaining the regional ecological balance.

119. (4) Infestation by root borers and parasitic fungi.
In recent years, the survival of the Khejri tree has been threatened by biological factors rather than climatic ones. Widespread infestations by root borers and various parasitic fungi have been identified as major causes of tree mortality across many districts. These pests weaken the trees, making them susceptible to stress. Research and conservation efforts are focused on managing these biological threats.

120. (1) Mangrove
Khejri, Rohida, and Ker are all characteristic species of the arid desert ecosystem found in Rajasthan, adapted to high temperatures and limited water. Mangroves, however, are trees that grow in coastal saline or brackish water and are not found in the landlocked desert state of Rajasthan. Therefore, Mangrove is the odd one out in this list of regional flora.

121. (3) First week of July
Van Mahotsav is celebrated annually in India during the first week of July. This timing coincides with the onset of the monsoon season in most parts of the country, providing ideal soil moisture for newly planted saplings to establish roots. In Rajasthan, the festival is used to promote large-scale afforestation and environmental awareness. It is a critical greening period.

122. (1) Amrita Devi Bishnoi
The historic Khejarli movement was led by Amrita Devi Bishnoi in 1730 to protect Khejri trees from being cut by the king's men. She and three hundred and sixty-three others sacrificed their lives to defend the trees, reflecting a deep-rooted commitment to environmental conservation. This movement is a legendary precursor to modern community-led forest management. Amrita Devi is iconic.

123. (4) The protection of trees and wildlife
The Bishnoi community of Rajasthan follows twenty-nine religious tenets established by Guru Jambheshwar, which place a fundamental emphasis on environmental ethics. These rules strictly mandate the protection of all trees and wildlife, prohibiting hunting and the felling of green trees. The community's unwavering dedication to these principles has made them global leaders in grassroots conservation. Their settlements are sanctuaries.

124. (2) Protect and share benefits of degraded forests with communities.
Village Forest Protection and Management Committees are the institutional backbone of Joint Forest Management in Rajasthan. Their primary objective is to involve local villagers in the protection and restoration of nearby degraded forest lands. In return for their conservation efforts, the community members share in the benefits, such as collecting minor forest produce. This approach balances environmental and livelihood goals.

125. (1) I, II, III, and V
Community forestry in Rajasthan is characterized by initiatives like Van Mahotsav and the protection of sacred groves known as Orans. The state also honors conservationists through the Amrita Devi Bishnoi Smriti Award. While Joint Forest Management relies on benefit-sharing, community forestry is vital for meeting local needs and reducing pressure on reserved areas. These four statements are correct.

126. (4) A sacred grove dedicated to a deity, conserved by community rules.
An 'Oran' is a traditional sacred grove found in Rajasthan, typically dedicated to a local deity or saint. These areas are conserved by the local community through strict traditional rules that prohibit the felling of trees. Orans serve as vital refuges for local biodiversity and help in recharging groundwater. They are excellent examples of indigenous conservation intertwined with religious beliefs.

127. (1) Decentralized, participatory approach involving stakeholders
Community forest management is based on a decentralized and participatory approach that empowers local stakeholders to manage their own natural resources. Instead of a top-down policing model, it relies on the active involvement of villagers in decision-making and forest protection. This model recognizes that local communities have a direct stake and valuable knowledge. Participation ensures long-term sustainability and social acceptance.

Downloaded from www.pdf.tube

128. (2) Indigenous species adapted to local conditions.
During Van Mahotsav in Rajasthan, the forest department and local bodies prioritize the planting of indigenous species. Trees like Neem, Khejri, Rohida, and Peepal are preferred because they are naturally adapted to the local climate and soil conditions. These native species have higher survival rates and provide better ecological services. Promoting indigenous flora is essential for maintaining the state's natural balance.

129. (2) The communities are granted complete ownership and land titles of the reserved forests under JFM.
In the Joint Forest Management framework, the legal ownership and land titles of the forest remain with the state government's forest department. Communities are granted rights to manage and share benefits from the forest produce, but they do not own the land itself. Therefore, the second statement is incorrect. JFM is a partnership where responsibilities and rewards are shared sustainably.

130. (1) Sustainable forest management and livelihoods
The integration of traditional community knowledge with modern silvicultural practices under Joint Forest Management leads to sustainable forest management. This collaborative approach helps in the effective restoration of degraded forests while simultaneously supporting local livelihoods through the provision of fodder and minor forest produce. By reducing conflicts between officials and villagers, JFM ensures an ecologically healthy environment. It is successful.

131. (3) A-iv, B-iii, C-i, D-ii
Rajasthan's diverse cattle breeds are specialized for different uses and regions. The Rathi is a high milk yielder from the Bikaner-Ganganagar belt. Tharparkar is a dual-purpose breed native to the border regions, known for heat resilience. The Nagori is an exceptional draft breed from Nagaur, while the Gir is a prominent milch breed from the Ajmer-Bhilwara tract.

132. (3) A is true but R is false.
The Rathi breed is indeed highly preferred in the northwestern arid regions of Rajasthan because of its excellent performance as a milch animal. However, the reason provided is false because Rathi cattle are famous for their high milk yield, not for being powerful draft animals. The Nagori breed is actually the most famous draft breed in the state.

133. (3) Gir
The Gir breed, also locally known as Renda or Ajmera in Rajasthan, is an indigenous cattle breed famous for its high milk production. It is easily recognized by its unique physical features, including a prominent convex forehead and long, pendulous ears that look like folded leaves. Gir cattle are highly resilient and primarily reared in the Ajmer and Bhilwara districts.

134. (2) Draft (draught) breed
The Nagori breed of cattle is primarily classified as an elite draft breed. These animals are renowned for their agility, endurance, and strength, making them excellent for heavy agricultural work and transportation in rural areas. They have a compact build and are known for their fast walking speed. Their value as working animals is unmatched in traditional farming systems.

135. (4) Kankrej
The Kankrej breed is native to the southwestern districts of Rajasthan, including Jalore and Barmer. It is one of the heaviest breeds of Indian cattle, characterized by large, lyre-shaped horns and a powerful build. Kankrej bullocks are famous for their "Sawai Chal," a unique, fast, and swinging gait that allows them to cover long distances quickly. It is dual-purpose.

136. (1) Heat-resilient, disease-resistant, and good milker on sparse pasture.
The Tharparkar breed is exceptionally well-suited for the harsh desert ecosystem of Rajasthan. These cattle are highly heat-resilient and possess a strong natural resistance to many common diseases. Most importantly, they can maintain good milk production even when grazing on sparse desert pastures with limited water. This makes them a vital asset for pastoral communities living in the arid border.

137. (3) Ramdev Cattle Fair (Nagaur)
The Ramdev Cattle Fair held in Nagaur is one of the largest and most significant state-level fairs in Rajasthan. It is predominantly famous for the trading of high-quality Nagori bullocks, which

NODIA

are sought after by farmers from across northern India for draft power. The fair is a major cultural and economic event, showcasing the state's rich livestock heritage.

138. (1) Cattle rearing acts as a primary insurance against frequent crop failures due to drought.
Cattle rearing is a cornerstone of the rural economy in Rajasthan, particularly because it acts as a primary insurance against frequent crop failures. In the face of erratic rainfall and droughts, livestock provide a steady source of income through milk and draft power when agriculture fails. Indigenous breeds sustain millions of rural households, providing resilience in the state's difficult environment.

139. (4) Alwar and Bharatpur
The Mewati or Kosi breed is a dual-purpose cattle breed found primarily in the Alwar and Bharatpur districts of Rajasthan. This region, known as Mewat, provides a suitable environment for these hardy animals. Mewati cattle are valued for their decent milk yield and the ability of bullocks to perform various tasks. They represent regional specialization adapted to semi-arid conditions eastwards.

140. (2) Foot and Mouth Disease (FMD)
Foot and Mouth Disease is a highly contagious viral threat to the cattle population in Rajasthan. It is characterized by high fever and the appearance of painful ulcers in the mouth and on the feet. This disease causes significant economic losses due to reduced milk yield and impaired working capacity. The state government carries out extensive vaccination campaigns for control.

141. (3) 2014
The camel was officially declared as the State Animal of Rajasthan in the livestock category in the year 2014. This decision recognized the camel's historical, cultural, and economic importance to the people, especially in arid regions. The declaration also aimed to bring more attention to the declining camel population and promote measures for their conservation and welfare in the desert.

142. (4) Bikaner (Jorbeer)
The National Research Centre on Camel is located at Jorbeer in the Bikaner district. It is a premier institute dedicated to the research and development of camels. The center focuses on various aspects of camel science, including breeding, nutrition, health, and commercial utilization. Its presence in Bikaner is ideal given the high camel population and traditional association with animals.

143. (1) Jaisalmeri
The Jaisalmeri breed of camel is renowned for its exceptional riding speed and agility. These camels have a slender build and are specifically adapted for traversing the deep sand dunes of the Thar Desert quickly. Because of their superior mobility and endurance, they are the primary choice for the Border Security Force's camel contingent. They are a symbol of security.

144. (2) A prominent depression above the eyes and heavy build.
The Bikaneri breed is one of the most populous and recognizable camel breeds in Rajasthan. It is characterized by a heavy and muscular build, making it excellent for draft work. A distinguishing physical feature is a prominent depression above the eyes, locally known as "Stop." These camels are versatile and are used for pulling carts and carrying heavy loads statewide.

145. (2) A-iii, B-ii, C-i, D-iv
Different camel breeds in Rajasthan serve specific purposes. The Bikaneri is the most populous and is used for heavy draft work. Jaisalmeri camels are famous for their agility and swift riding. The Mewari breed is uniquely adapted to hilly terrain and has a prominent lower lip. The Gomath breed is another famous riding variety found in the Phalodi region.

146. (1) Diabetes management
Camel milk is gaining commercial and medicinal importance because of its unique nutritional profile. It is particularly valued for its potential therapeutic role in the management of diabetes, as it contains insulin-like proteins that help regulate blood sugar levels. Furthermore, it is easier to digest and rich in minerals. This interest is opening new economic avenues for camel herders.

Click Here to Buy book on Amazon

147. (3) Usta Art
Usta Art is a traditional and highly intricate form of art from Bikaner that involves creating beautiful patterns on various surfaces. On camels, it specifically refers to the practice of clipping and shaving hair to create geometric and floral designs on the animal's body. These decorated camels are a major attraction. This art form represents a deep cultural connection.

148. (4) Camel breeding and herding
The Raika or Rabari community of Rajasthan is historically and traditionally associated with camel breeding and herding. They possess extensive indigenous knowledge about camel care, health, and migration patterns. For generations, they have been the primary guardians of Rajasthan's camel population, leading their herds across vast desert landscapes. Their lifestyle and culture are intricately linked to species survival in India.

149. (3) Mechanization, shrinking grazing lands, and movement restrictions.
The recent decline in the camel population in Rajasthan is attributed to several modern challenges. The rapid mechanization of agriculture and transport has reduced the demand for camel draft power. Additionally, the shrinking of traditional grazing lands and stricter restrictions on movement have made herding more difficult. Addressing these issues is critical for conservation and the livelihoods of pastoral communities.

150. (2) Trypanosomiasis (Surra)
Trypanosomiasis, locally known as "Surra" or "Tibersa," is the most economically significant parasitic disease affecting camels in Rajasthan. It is transmitted by biting flies and can be fatal if not treated promptly. The disease causes chronic weakness, fever, and a significant drop in productivity. Managing Surra through regular screening and veterinary care is essential for maintaining a healthy camel population.

151. (4) A-i, B-iii, C-ii, D-iv
Rajasthan's sheep breeds are renowned for their specific wool qualities. The Chokla is known as the "Merino of Rajasthan" for its fine carpet wool. Magra sheep produce highly lustrous white wool, while the Marwari is the most populous breed with high disease resistance. Nali sheep yield a characteristic yellow-tinged wool and are found in the northern districts of the state.

152. (1) Wool
Rajasthan is the leading producer of wool in India, accounting for a significant share of the national output. The state's large population of indigenous sheep breeds, adapted to the arid and semi-arid environment, provides a diverse range of wool types. From fine wool to lustrous carpet wool, Rajasthan's production is highly valued. This sector is a major income source.

153. (3) Avikanagar (Malpura, Tonk)
The Central Sheep and Wool Research Institute is located at Avikanagar in the Malpura tehsil of Tonk district. Established under ICAR, this institute is the premier center for research on sheep and wool technology in India. It works on improving breed quality, enhancing wool production, and developing better management practices. The institute's contributions have been instrumental in modernizing the sector.

154. (1) Sirohi
The Sirohi goat is a prominent breed in Rajasthan, particularly in the Ajmer-Nagaur and Sirohi belts. It is known for its large size, flat leaf-like ears, and a distinct "Roman nose." This breed is highly valued for both meat and milk production and is well-adapted to the hot and dry climate. It is used for improving various local goat populations.

155. (1) I and II only
Goats are often called the "poor man's cow" as they provide reliable nutrition security to rural households during droughts. Rajasthan is a powerhouse in the wool sector, producing over 30% of the country's total wool. However, the Barbari goat is actually a small, prolific breed suited for stall feeding in semi-arid and humid areas, not Jaisalmer. These two statements are correct.

156. (2) Bikaner
The Pugal breed of sheep is native to the Bikaner district of Rajasthan. It is easily recognized by its black face, which has characteristic light brown stripes or spots above the eyes. These sheep are hardy and well-adapted to the hyper-arid conditions of the Thar Desert. Pugal sheep

NODIA

mortality rates and a significant drop in egg production and growth. Managing this challenge requires significant investment in cooling systems and proper ventilation. Heat stress remains the biggest environmental hurdle for maintaining consistent productivity.

175. (2) I, II, and IV
Poultry farming in Rajasthan is centralized around Ajmer, with the White Leghorn being the primary breed for commercial egg production. Additionally, contract farming is a growing trend in the broiler sector. However, stating that Ranikhet disease is a negligible threat is incorrect; it is actually a major viral disease requiring strict vaccination. Thus, the first, second, and fourth statements are correct.

176. (2) Pratapdhan
Pratapdhan is an improved, dual-purpose poultry breed specifically developed for backyard farming in rural Rajasthan. It is a crossbreed that combines the hardiness of indigenous birds with high productivity. These birds are well-adapted to local conditions, can survive on scavenging, and provide both a decent number of eggs and good quality meat. It is a key breed promoted for livelihood enhancement.

177. (1) B, A, D, C
Commercial broiler farming starts with thorough cleaning and disinfection of the poultry house, followed by laying fresh litter. Next, the brooding area is pre-heated to provide the right temperature for young birds. The third step is the arrival and placement of Day-Old Chicks. Finally, after approximately thirty-five to forty days of growth, the birds are harvested for the market statewide.

178. (1) Birds raised specifically for egg production
In the poultry industry, the term 'Layer' specifically refers to female birds that are reared for the primary purpose of commercial egg production. These birds start laying eggs at around eighteen to twenty weeks of age and continue for about a year. Management practices for layers, such as nutrition and light control, are different from those for meat-type birds like broiler chickens.

179. (3) Poultry feed costs
In commercial poultry farming, the largest recurring cost is poultry feed, which can account for up to seventy percent of the total operational expenses. The price of feed is heavily influenced by the market rates of ingredients like maize and soybean meal. Efficient feed management and high feed conversion ratios are essential for the profitability of a poultry farm in Rajasthan's economy.

180. (4) Evaporative cooling systems and proper ventilation.
To combat the harsh summer climate, commercial poultry farmers in Rajasthan extensively use evaporative cooling systems, such as foggers and cooling pads. These systems, combined with proper ventilation, help in significantly lowering the temperature inside the poultry house. Maintaining a comfortable environment is critical for preventing heat-related deaths and ensuring that the birds continue to grow and produce eggs efficiently in the heat.

181. (3) A-ii, B-iii, C-i, D-iv
Rajasthan's diverse water bodies are critical for the inland fisheries sector. Jaisamand Lake in Udaipur is a major site for tribal fisheries. Ramgarh Dam in Jaipur is a historic site, though currently seasonal. Bisalpur Dam in Tonk and Mahi Bajaj Sagar in Banswara are among the state's largest reservoirs, providing significant potential for commercial fish production through local fishing communities.

182. (2) Inland freshwater fisheries
Since Rajasthan is a landlocked state with no coastline, its fisheries sector is entirely restricted to inland freshwater resources. This includes various rivers, canals, seasonal lakes, and large man-made reservoirs. The state has significant potential for fish production through the scientific management of these freshwater bodies. Inland fisheries play a vital role in providing nutritional security and livelihood opportunities to rural populations.

183. (4) Rohu, Catla, and Mrigal
The commercial fish catch in Rajasthan is dominated by the 'Major Indian Carps', namely Rohu, Catla, and Mrigal. These species are highly preferred for aquaculture because of their fast

Downloaded from www.pdf.tube

returns. It ensures that the procurement process is fair.

166. (2) A direct financial subsidy per liter over procurement price.
The Mukhyamantri Dugdh Utpadak Sambal Yojana is a state government initiative designed to support milk producers. Under this scheme, the government provides a direct financial subsidy per liter of milk supplied to cooperative dairies, over and above the regular procurement price. This extra incentive helps in making dairy farming more profitable and encourages more farmers to join the cooperative dairy network.

167. (4) RCDF strictly markets only liquid milk and prohibits the sale of value-added products like ghee and paneer.
RCDF, through its 'Saras' brand, markets a wide range of products beyond just liquid milk. This includes value-added dairy products like ghee, paneer, butter, curd, and even sweets. Diversifying into value-added products is a core strategy to increase the profitability of the cooperative and ensure better returns for farmers. Therefore, the statement that RCDF prohibits the sale of such products is incorrect.

168. (1) Murrah
The Murrah buffalo is the most prominent and high-yielding dairy breed in the eastern and southeastern districts of Rajasthan. Known for its high milk production with high fat content, it is often referred to as "black gold." Murrah buffaloes are well-adapted to the intensive dairy farming systems of these regions. They play a critical role in fulfilling urban milk demand statewide.

169. (3) Chilling milk at the village level to maintain quality.
Bulk Milk Coolers are essential components of the modern dairy supply chain in Rajasthan. They are installed at village collection centers to immediately chill raw milk after procurement. By lowering the temperature, BMCs inhibit the growth of bacteria and maintain the quality of the milk until it can be transported to a larger processing plant. This has significantly reduced milk spoilage and quality.

170. (1) Jaipur
Jaipur district boasts the largest and most advanced dairy plant in Rajasthan, managed by the Jaipur Zila Dugdh Utpadak Sahakari Sangh Limited. This massive facility handles enormous volumes of milk daily for pasteurization, packaging, and the manufacture of various dairy products. Its strategic location allows it to cater to the high demand of the state capital and the surrounding urban areas.

171. (4) Ajmer
Ajmer district is widely recognized as the "Poultry Hub" or the "Egg Basket" of Rajasthan. It has the highest concentration of commercial layer farms in the state, supported by excellent infrastructure and established market networks. The region's climate and geographical location make it an ideal center for large-scale poultry production. Ajmer's poultry industry contributes significantly to the state's agricultural economy and supply.

172. (2) Empower rural poor for supplementary income and nutrition.
The backyard poultry farming initiative in Rajasthan is designed to help the rural poor and marginalized communities. By providing high-yielding but hardy bird varieties, the government aims to create opportunities for supplementary income and improve household nutritional security through production. This low-investment activity is particularly effective for empowering rural women and ensuring protein-rich food is available at the grassroots level in villages.

173. (3) Kadaknath
Kadaknath is an indigenous poultry breed famous for its unique jet-black feathers, skin, and even flesh. While it originated in central India, it is now popular in Rajasthan due to its high nutritional value and reputed medicinal properties. The meat is low in fat and high in protein compared to common broilers. Its distinct appearance and benefits have created a niche market.

174. (4) Heat stress causing high mortality and low egg production.
A major constraint for the commercial poultry sector in Rajasthan's arid regions is the extreme summer heat. High temperatures can cause severe heat stress in birds, leading to increased

NODIA

promoting sustainable and climate-resilient practices to increase farmer income. This involves improving water productivity, enhancing market linkages, and encouraging technology adoption. By making farming more competitive and resilient to climatic shocks, the project ensures long-term prosperity for rural state communities.

193. (2) Self Help Groups (SHGs) for agri-allied activities.
The Rajasthan Grameen Aajeevika Vikas Parishad plays a crucial role in rural development by organizing women into Self Help Groups. These groups are provided with training and financial support to engage in various agri-allied activities like dairy, poultry, and goat rearing. This collective approach helps rural women access credit, improve skills, and gain financial independence. It is a powerful tool.

194. (1) Nutrient status and recommendations for fertilizer dosages.
The Soil Health Card Scheme is a vital tool for scientific farming in Rajasthan. Under this scheme, soil samples from farmers' fields are analyzed to determine nutrient status. Based on the results, farmers receive a health card that provides specific recommendations for the required dosages of various fertilizers and amendments. This helps in avoiding over-application, reducing costs, and maintaining long-term fertility.

195. (1) I and II only
Agricultural initiatives in Rajasthan like the KUSUM scheme promote solar energy for irrigation pumps, while the e-NAM portal creates a transparent national market for farmers. However, the state government actually encourages organic farming through various incentives and certification programs, rather than discouraging it. Therefore, only the statements regarding solar pumps and the electronic national agricultural market are correct and relevant.

196. (2) I, II, and IV
The Mukhyamantri Kamdhenu Bima Yojana provides essential insurance cover for milch animals in Rajasthan. It insures a maximum of two animals per family and offers a financial cover of up to forty thousand rupees per animal in case of sudden death. However, it does not cover the cost of building new dairy sheds. By providing this protection, it helps households.

197. (1) I, II, III, and V
Rajasthan promotes micro-irrigation through subsidies for drip and sprinkler systems, with extra support for small and marginal farmers. This significantly improves water use efficiency and helps expand the area under horticulture. While it relies on quality standards, it does not strictly mandate imported equipment. Therefore, the first, second, third, and fifth statements correctly describe the scheme's role in development.

198. (1) C, A, B, D
Availing benefits under the PM Fasal Bima Yojana begins with the farmer's enrollment and payment of a nominal premium before the seasonal cutoff date. If a crop loss occurs due to a localized calamity, the farmer intimates the insurance company within seventy-two hours. Subsequently, a survey and assessment of the damage are conducted. Finally, the claim is settled directly.

199. (4) Paramparagat Krishi Vikas Yojana (PKVY)
The Paramparagat Krishi Vikas Yojana is the primary government scheme dedicated to promoting organic farming in Rajasthan. It focuses on cluster-based organic production with a focus on certification and market linkages. Farmers are encouraged to use traditional methods and bio-inputs to improve soil health and produce chemical-free food. PKVY plays a vital role in making organic farming a profitable alternative.

200. (1) Farmer production of quality seeds for self-reliance.
The core objective of the Mukhyamantri Beej Swavalamban Yojana is to make farmers self-reliant in terms of quality seed availability. Under this scheme, farmers are trained to produce and process high-quality seeds of various crops on their own farms. This reduces their dependence on commercial seeds and ensures they have access to reliable planting material suited to their local conditions.

Click Here to Buy book on Amazon

growth rate and high consumer demand. They occupy different levels of the water column, allowing for efficient use of pond resources. Most of the fish seed stocked belongs to these three species.

184. (1) Housing, insurance, and relief during the closed season.
The National Scheme of Welfare of Fishermen aims to improve the living conditions of the fishing community in Rajasthan. Key components include providing financial assistance for building low-cost houses and accidental insurance cover. Additionally, a relief fund is established to support fishermen during the closed monsoon season when fishing is prohibited. These welfare measures are essential for social and economic security.

185. (1) I, II, III, and IV
Rajasthan's fisheries have high potential in southern reservoirs, though seed production remains a challenge addressed through hatcheries. The state is home to the famous Mahseer fish, and ornamental farming is gaining popularity. However, fishing in large reservoirs is strictly regulated through a licensing and leasing system, making the fifth statement incorrect. Thus, the first four statements are correct.

186. (1) Tilapia and African Catfish
The introduction of certain exotic fish species like Tilapia and African Catfish has raised ecological concerns in Rajasthan's water bodies. These species are highly aggressive and prolific breeders, often out-competing indigenous carps for food and habitat. Their presence can lead to a decline in native fish biodiversity and disrupt the traditional fishing economy. Efforts are made to promote native species aquaculture.

187. (4) Composite Fish Culture
Composite fish culture is a modern aquaculture practice where several different species of fish are reared together in a single pond. The species are chosen based on their non-competitive feeding habits; for example, Catla feeds at the surface, Rohu in the middle, and Mrigal at the bottom. This approach ensures that all ecological niches and available nutrients are fully utilized.

188. (2) Monsoon is the natural breeding and spawning season.
The fishing season in Rajasthan's natural water bodies is officially closed during the monsoon months. This is because most freshwater fish species breed and spawn during this period. Prohibiting fishing allows the fish to reproduce undisturbed and ensures the replenishment of fish stocks for the next season. This biological management practice is essential for the long-term sustainability of the fisheries sector.

189. (3) Cage culture
Cage culture is an advanced aquaculture technology being promoted in Rajasthan to increase fish productivity in large reservoirs. In this system, fish are reared in enclosed mesh cages suspended in the water body. This allows for intensive feeding and monitoring while utilizing the existing water resources. Cage culture is particularly useful for achieving high yields in areas where traditional construction is impossible.

190. (4) Churu
Inland saline water aquaculture has seen a breakthrough in the Churu district of Rajasthan. Despite being in the desert, the region has vast tracts of saline groundwater. Experiments in farming Whiteleg shrimp have been remarkably successful here. This innovative approach turns a geographical constraint into an economic opportunity, providing a high-value export product from an arid landscape for local farmers.

191. (1) A-iii, B-ii, C-iv, D-i
Various government schemes support the agricultural sector in Rajasthan. PMFBY provides comprehensive risk cover for crops, while PMKSY focuses on improving water use efficiency through micro-irrigation. The National Livestock Mission aims for qualitative livestock improvement. At the state level, the Mukhyamantri Krishak Sathi Yojana provides critical financial assistance to farmers in case of accidental injury or death during farm operations.

192. (2) Sustainable and climate-resilient agriculture for higher income.
The Rajasthan Agricultural Competitiveness Project is a major initiative aimed at transforming the state's agriculture. Its primary focus is on

Downloaded from www.pdf.tube

provide carpet-quality wool and are an important component of the livestock economy.

157. (3) Barbari
The Barbari is a small, compact goat breed that is highly prolific and well-suited for stall feeding. Unlike many other breeds that require extensive grazing, Barbari goats adapt well to being kept in confined spaces. They often give birth to twins or triplets twice a year, making them highly profitable for meat production. They are popular in eastern and semi-arid regions.

158. (4) Extensive and nomadic pastoralism
Sheep and goat rearing in Rajasthan is primarily characterized by an extensive and often nomadic pastoral management system. Herders move their flocks over large distances in search of seasonal pastures and water, especially during the dry months. This traditional system is an adaptation to erratic rainfall and sparse vegetation. Pastoralism remains a vital socio-economic lifestyle for many communities in the state.

159. (1) Improve wool quantity and fineness
Cross-breeding indigenous sheep breeds with exotic ones like Rambouillet and Merino is a strategy used to improve the quality and quantity of wool produced in Rajasthan. Indigenous breeds are hardy but often produce coarser wool. By introducing genes from exotic breeds known for fine wool, the state aims to produce higher-value textiles. This program helps in increasing the income of farmers.

160. (2) Enterotoxemia
Enterotoxemia, also known as Pulpy Kidney Disease, is a highly fatal bacterial disease that affects sheep in Rajasthan. It is often triggered by sudden changes in diet, such as moving from dry pasture to lush green fields or grain-heavy feeds. The bacteria release toxins that cause sudden death. Regular vaccination is the most effective way to protect flocks from this disease.

161. (2) A-i, B-ii, C-iii, D-iv
The dairy sector in Rajasthan is organized into several levels. The Rajasthan Cooperative Dairy Federation is the apex state-level body. It markets its products under the well-known brand name 'Saras'. The National Dairy Development Board provides nationwide support, while District Milk Unions manage actual procurement and processing of milk locally. This structured approach ensures efficiency from the village to consumer.

162. (1) Both A and R are true and R is the correct explanation of A.
The cooperative dairy sector in Rajasthan follows the successful three-tier "Anand Pattern" structure, which has revolutionized milk production. This system organizes farmers into Village Dairy Cooperative Societies, which then feed into District Milk Unions and finally the State Level Federation. This structure is designed to eliminate exploitative middlemen and ensure that farmers receive fair and stable prices for their milk.

163. (3) 1977
The Rajasthan Cooperative Dairy Federation was set up in 1977 to implement and oversee various dairy development programs across the state. Its establishment marked a significant step toward organizing the fragmented dairy sector into a powerful cooperative movement. Since its inception, RCDF has worked to improve milk procurement, processing infrastructure, and marketing, helping Rajasthan become a leading milk producer in India.

164. (4) Regular income for households, especially empowering women.
The village-level milk cooperative societies have had a profound socio-economic impact in Rajasthan. By providing a reliable daily market for milk, they ensure a regular cash income for rural households, which is vital during agricultural lean periods. Furthermore, as women are often the primary caretakers of livestock, their involvement in these cooperatives has significantly empowered them financially and socially. This is development.

165. (3) FAT and Solid Not Fat (SNF) content
In the cooperative dairy network of Rajasthan, the price paid to farmers for their raw milk is determined by its quality. This is scientifically measured based on the FAT content and the Solid Not Fat (SNF) content. This transparent pricing system encourages farmers to maintain better livestock nutrition and hygiene for higher

NODIA

CHAPTER 09

Key Government Programmes and Policies

1. What was the primary objective of the Scientific Policy Resolution (SPR) of 1958?
(1) To prioritize the development of military and defense technologies
(2) To foster and sustain scientific research in all its various aspects
(3) To strictly limit international collaboration in space research programs
(4) To privatize all existing government-owned scientific laboratories
(5) Question not attempted

2. Which eminent Indian scientist is credited with drafting the Scientific Policy Resolution of 1958 alongside the then leadership?
(1) Homi J. Bhabha
(2) C. V. Raman
(3) Meghnad Saha
(4) Vikram Sarabhai
(5) Question not attempted

3. Which of the following best defines the core vision of the Scientific Policy Resolution 1958?
(1) Establishing a purely theoretical framework for national science
(2) Banning the import of all foreign-made scientific equipment
(3) Supporting individual initiative for the acquisition of knowledge
(4) Discontinuing the teaching of traditional sciences in colleges
(5) Question not attempted

4. Identify the incorrect statement regarding the Scientific Policy Resolution 1958.
(1) It was the first formal science policy adopted by the Government of India.
(2) It aimed to secure for the people of the country all the benefits that can accrue from the acquisition and application of scientific knowledge.
(3) It emphasized the development of a scientific temper among the citizens.
(4) It proposed a reduction in the remuneration of scientific workers to save government funds.
(5) Question not attempted

5. Match the policies in List I with their corresponding year of implementation in List II.
List I: (Policy/Document)
A. Scientific Policy Resolution
B. Technology Policy Statement
C. Science and Technology Policy
D. Science, Technology and Innovation Policy
List II: (Year of Implementation)
i. 2003
ii. 2013
iii. 1958
iv. 1983
(1) A-iv, B-iii, C-ii, D-i
(2) A-iii, B-i, C-iv, D-ii
(3) A-iii, B-iv, C-i, D-ii
(4) A-ii, B-iv, C-i, D-iii
(5) Question not attempted

6. Which of the following was a direct long-term effect of the adoption of the Scientific Policy Resolution 1958?
(1) Complete isolation of Indian science from the Western world
(2) Expanding the network of national laboratories and institutes
(3) The abolition of the central Ministry of Science and Technology
(4) The immediate decline of traditional Indian agriculture systems
(5) Question not attempted

7. The Science, Technology and Innovation Policy (STIP) 2013 introduced a new paradigm. Which of the following correctly identifies this paradigm?
(1) Science for Technology and Technology for Industry
(2) Innovation for self-reliance and global

Click Here to Buy book on Amazon

dominance
(3) Technology transfer for foreign direct investment
(4) Science, technology and innovation for the people
(5) Question not attempted

8. What was the stated target for the Gross Expenditure on Research and Development (GERD) as a percentage of GDP in the Science, Technology and Innovation Policy 2013?
(1) 1 percent
(2) 2 percent
(3) 3.5 percent
(4) 5 percent
(5) Question not attempted

9. Which of the following is an exception to the key focus areas of the Science, Technology and Innovation Policy 2013?
(1) Enhancing private sector participation in R&D
(2) Promoting gender parity in science
(3) Eliminating intellectual property rights for basic research
(4) Fostering resource-optimized, cost-effective innovations
(5) Question not attempted

10. Consider the following statements regarding the Science, Technology and Innovation Policy 2013:
I. It aimed to position India among the top five global scientific powers by 2020.
II. It focused on creating an environment for enhanced private sector investment in R&D.
III. It completely prohibited foreign collaboration in strategic scientific research.
Which of the above statements is/are correct?
(1) I and II only
(2) II and III only
(3) I and III only
(4) I, II, and III
(5) Question not attempted

11. Which conceptual framework forms the foundation of the National Science, Technology and Innovation Policy (STIP) 2020?
(1) Top-down, highly centralized governance
(2) Exclusive reliance on foreign technological imports
(3) Complete privatization of space and atomic research
(4) Decentralized, bottom-up, and inclusive architecture
(5) Question not attempted

12. The STIP 2020 proposes an "Open Science Framework." Which of the following best describes its primary initiative?
(1) Abolition of patent laws in India
(2) 'One Nation, One Subscription' for scientific journals
(3) Mandatory publication of all research in foreign journals
(4) Restriction of scientific data only to government bodies
(5) Question not attempted

13. Identify the correct pair regarding the structural features of STIP 2020.
(1) Capacity Building - Focuses exclusively on urban higher education institutes
(2) Financing - Proposes a reduction in R&D budgets to offset fiscal deficits
(3) Equity and Inclusion - Mandates 30% women representation in committees
(4) Traditional Knowledge - Ignores indigenous knowledge systems entirely
(5) Question not attempted

14. Which of the following is a proposed financial mechanism under STIP 2020 to boost research funding?
(1) Sovereign Wealth Fund for Innovation
(2) International Monetary Fund Grants Setup
(3) Direct Tax Code for Science
(4) National Research Foundation (NRF)
(5) Question not attempted

15. Select the correct chronological order of the issuance of India's major Science and Technology policies.
(1) SPR 1958 → TPS 1983 → STP 2003 → STIP 2013
(2) TPS 1983 → SPR 1958 → STIP 2013 → STP 2003
(3) SPR 1958 → STP 2003 → TPS 1983 → STIP 2013
(4) STP 2003 → SPR 1958 → STIP 2013 → TPS 1983
(5) Question not attempted

NODIA

16. What is the expected outcome of the 'One Nation, One Subscription' policy proposed in STIP 2020?
(1) Restricting access to research only for elite tier-one institutions
(2) Providing journal access for all individuals and institutions in India
(3) Increasing subscription fees for individual independent researchers
(4) Banning the publication of Indian research in international journals
(5) Question not attempted

17. In which year was the Department of Science and Technology (DST) established?
(1) 1958
(2) 1971
(3) 1983
(4) 1991
(5) Question not attempted

18. Which flagship scheme of the Department of Science and Technology (DST) aims to attract talent to the study of science at an early age?
(1) INSPIRE
(2) NIDHI
(3) KIRAN
(4) SERB
(5) Question not attempted

19. Identify the incorrect statement regarding the Department of Science and Technology (DST).
(1) It acts as the nodal department for organizing, coordinating and promoting S&T activities in India.
(2) It supports scientific research through autonomous bodies and statutory institutions.
(3) It functions under the Ministry of Earth Sciences.
(4) It provides funding for fundamental and applied research in academic institutions.
(5) Question not attempted

20. Consider the following statements about Department of Science and Technology (DST) schemes:
I. NIDHI aims at nurturing ideas and innovations into successful startups.
II. KIRAN is focused on empowering women scientists.
III. INSPIRE provides scholarships for higher education in humanities.
IV. SERB is a statutory body under DST to promote basic research.
Which of the above statements are correct?
(1) I, II, and III only
(2) II, III, and IV only
(3) I, II, and IV only
(4) I, III, and IV only
(5) Question not attempted

21. Which organization functions as the premier industrial research and development entity in India, operating a network of laboratories across the country?
(1) ISRO
(2) DRDO
(3) CSIR
(4) ICMR
(5) Question not attempted

22. Who serves as the ex-officio President of the Council of Scientific and Industrial Research (CSIR)?
(1) President of India
(2) Prime Minister of India
(3) Minister of Science and Technology
(4) Director General of CSIR
(5) Question not attempted

23. The prestigious Shanti Swarup Bhatnagar Prize is awarded annually by which institution?
(1) DST
(2) NITI Aayog
(3) National Science Academy
(4) CSIR
(5) Question not attempted

24. Find the odd one out among the following Council of Scientific and Industrial Research (CSIR) laboratories.
(1) Vikram Sarabhai Space Centre (VSSC)
(2) National Physical Laboratory (NPL)
(3) National Chemical Laboratory (NCL)
(4) Centre for Cellular and Molecular Biology (CCMB)
(5) Question not attempted

25. Match the laboratories in List I with their respective locations in List II.
List I: (CSIR Laboratory)

Downloaded from www.pdf.tube

A. National Physical Laboratory (NPL)
B. National Chemical Laboratory (NCL)
C. National Environmental Engineering Research Institute (NEERI)
D. Centre for Cellular and Molecular Biology (CCMB)

List II: (Location)
i. Pune
ii. Hyderabad
iii. Nagpur
iv. New Delhi

(1) A-i, B-iv, C-ii, D-iii
(2) A-iv, B-iii, C-i, D-ii
(3) A-iv, B-i, C-iii, D-ii
(4) A-ii, B-i, C-iii, D-iv
(5) Question not attempted

26. Which of the following initiatives is a collaborative project between the Council of Scientific and Industrial Research (CSIR) and the Ministry of AYUSH to prevent the misappropriation of traditional Indian knowledge?
(1) Traditional Knowledge Digital Library (TKDL)
(2) JIGYASA
(3) CSIR-Aroma Mission
(4) CSIR-800
(5) Question not attempted

27. The Atal Innovation Mission (AIM) was launched under the aegis of which organization?
(1) Department of Science and Technology
(2) Ministry of Skill Development
(3) Ministry of Education
(4) NITI Aayog
(5) Question not attempted

28. What is the primary target demographic for the Atal Tinkering Labs (ATLs) established under the Atal Innovation Mission?
(1) University research scholars
(2) School students in grades 6 to 12
(3) Faculty members in engineering colleges
(4) Unemployed rural youth
(5) Question not attempted

29. Which component of the Atal Innovation Mission is specifically designed to support and foster world-class startups and add value to the startup ecosystem?
(1) Atal Tinkering Labs
(2) Mentor India Campaign
(3) Atal Incubation Centres (AICs)
(4) ARISE
(5) Question not attempted

30. Consider the following components under the Atal Innovation Mission (AIM):
I. Atal Tinkering Labs
II. Atal Incubation Centres
III. Atal New India Challenges
IV. Mentor India Campaign
V. Atal Grand Challenges

Which of the above correctly lists the core operational initiatives of AIM?
(1) I, II, and III only
(2) II, III, IV, and V only
(3) I, II, III, IV, and V
(4) I, III, and V only
(5) Question not attempted

NODIA

31. Identify the correct pair regarding Atal Innovation Mission (AIM) initiatives.
(1) ARISE - Applied Research and Innovation for Small Enterprises
(2) AIM-SIRIUS - Bilateral innovation program with the USA
(3) AIM iCREST - Incubator capability enhancement program with absolute domestic focus without foreign partners
(4) Atal Community Innovation Centres - Focused solely on tier-1 metropolitan cities
(5) Question not attempted

32. What is the primary objective of the National Innovation Foundation (NIF) India?
(1) To fund massive industrial manufacturing parks across the country
(2) To support grassroots innovations and traditional knowledge
(3) To regulate foreign direct investment in the core technology sector
(4) To provide monthly stipends for basic science research in universities
(5) Question not attempted

33. The National Innovation Foundation (NIF) functions as an autonomous body under which government department?
(1) Department of Science and Technology
(2) Department of Biotechnology

(3) Department of Scientific and Industrial Research
(4) Ministry of Micro, Small and Medium Enterprises
(5) Question not attempted

34. Which annual award initiative is conducted by the National Innovation Foundation (NIF) in association with the Honey Bee Network to encourage creativity among school children?
(1) INSPIRE Awards
(2) JIGYASA Awards
(3) IGNITE Awards
(4) NIDHI PRAYAS
(5) Question not attempted

35. Arrange the following initiatives/institutions in the correct chronological order of their establishment:
I. Council of Scientific and Industrial Research (CSIR)
II. Department of Science and Technology (DST)
III. National Innovation Foundation (NIF)
IV. Atal Innovation Mission (AIM)
(1) I, II, III, IV
(2) II, I, III, IV
(3) I, III, II, IV
(4) II, III, I, IV
(5) Question not attempted

36. Which financial mechanism was established by the National Innovation Foundation (NIF) in collaboration with SIDBI to provide financial support to grassroots innovators?
(1) Grassroots Innovation Fund
(2) Atal Seed Fund
(3) Micro Venture Innovation Fund (MVIF)
(4) NIF incubation Grant
(5) Question not attempted

37. In the context of the National Innovation Foundation (NIF), which of the following statements is true regarding its role in intellectual property rights (IPR)?
(1) NIF strictly prohibits innovators from filing patents.
(2) NIF assists grassroots innovators in filing patents to protect their intellectual property.
(3) NIF automatically acquires the IPR of any innovation submitted to it.
(4) NIF only recognizes innovations that are open-source and free from IPR.
(5) Question not attempted

38. In which year was the "Make in India" initiative launched to transform the country into a global design and manufacturing hub?
(1) 2012
(2) 2014
(3) 2016
(4) 2018
(5) Question not attempted

39. Which government department is the nodal agency for implementing the "Make in India" initiative?
(1) Department for Promotion of Industry and Internal Trade (DPIIT)
(2) Ministry of Finance
(3) Ministry of Science and Technology
(4) NITI Aayog
(5) Question not attempted

40. The following question consists of two statements—Assertion (A) and Reason (R). Answer the question by selecting the appropriate option.
Assertion (A): The Make in India initiative includes raising the Foreign Direct Investment (FDI) limits in various sectors.
Reason (R): Increased FDI is expected to bring in foreign capital, technology transfer, and boost domestic manufacturing capabilities.
(1) Both A and R are true and R is the correct explanation of A.
(2) Both A and R are true but R is not the correct explanation of A.
(3) A is true but R is false.
(4) A is false but R is true.
(5) Question not attempted

41. Which of the following is NOT one of the four pillars of the "Make in India" initiative?
(1) New Processes
(2) New Infrastructure
(3) New Tariffs
(4) New Mindset
(5) Question not attempted

Click Here to Buy book on Amazon

42. How does the Production Linked Incentive (PLI) scheme complement the Make in India initiative?
(1) Providing financial incentives to attract large investments
(2) Offering special tax holidays only for foreign tech workers
(3) Implementing a ban on all imported goods in specific sectors
(4) Nationalizing all successful private manufacturing units
(5) Question not attempted

43. Under the Atmanirbhar Bharat Abhiyan, what does the term "Atmanirbhar" fundamentally emphasize in the context of technology and economy?
(1) Complete economic isolation and extreme protectionism
(2) Continuous dependency on foreign aid for technology
(3) Immediate eradication of all domestic private enterprises
(4) Self-reliance while remaining integrated globally
(5) Question not attempted

44. The Atmanirbhar Bharat Abhiyan is built on five pillars. Which of the following correctly identifies them?
(1) Economy, Agriculture, Technology, Export, and Demand
(2) Economy, Infrastructure, System, Vibrant Demography, and Demand
(3) Infrastructure, Defense, Space, Health, and Education
(4) Governance, Infrastructure, Technology, Demography, and Subsidies
(5) Question not attempted

45. Match the initiatives in List I with their corresponding sector or objective in List II.
List I: (Initiative)
A. Positive Indigenization List
B. Commercial Mining
C. PM e-VIDYA
D. Production Linked Incentive
List II: (Sector/Objective)
i. Coal Sector
ii. Defence Sector
iii. Manufacturing Sector
iv. Education Sector
(1) A-i, B-ii, C-iii, D-iv
(2) A-ii, B-iii, C-iv, D-i
(3) A-ii, B-i, C-iv, D-iii
(4) A-iv, B-i, C-ii, D-iii
(5) Question not attempted

46. What is the significance of the "Positive Indigenization Lists" notified by the Ministry of Defence under the Atmanirbhar Bharat initiative?
(1) They list high-tech weapons that must be imported with urgent priority.
(2) They are lists of defense personnel who are eligible for foreign training.
(3) They detail the technologies India will export only to allied countries.
(4) They list items with import embargoes to promote domestic manufacturing.
(5) Question not attempted

47. Which of the following policy changes in the space sector was a direct result of the Atmanirbhar Bharat announcements?
(1) Creation of IN-SPACe to promote private space activities
(2) Banning private sector participation in space exploration
(3) Merging ISRO with DRDO to create a unified defense body
(4) Restricting satellite launches to foreign commercial entities
(5) Question not attempted

48. Given below are two statements regarding Atmanirbhar Bharat.
Statement I: The Atmanirbhar Bharat package increased the FDI limit in defence manufacturing under the automatic route to 74%.
Statement II: This step was taken to discourage foreign original equipment manufacturers (OEMs) from investing in India.
In light of the above statements, choose the correct answer from the options given below:
(1) Both Statement I and Statement II are true
(2) Both Statement I and Statement II are false
(3) Statement I is true but Statement II is false
(4) Statement I is false but Statement II is true
(5) Question not attempted

NODIA

49. Find the odd one out concerning the major structural reforms announced during the Atmanirbhar Bharat packages.
(1) Commercialization of the coal sector
(2) Privatization of all public sector banks immediately
(3) Enhancing self-reliance in defence production
(4) Liberalizing geospatial data policies
(5) Question not attempted

50. Consider the following statements regarding the Atmanirbhar Bharat package:
I. It was announced in response to the economic impact of the COVID-19 pandemic.
II. The total economic stimulus was equivalent to approximately 10% of India's GDP.
III. It focused strictly on providing free food grains without any structural reforms.
Which of the above statement(s) is/are correct?
(1) I and II only
(2) II and III only
(3) I and III only
(4) I, II, and III
(5) Question not attempted

51. The Digital India Mission was launched with the vision of transforming India into a digitally empowered society and knowledge economy. In what year was it launched?
(1) 2012
(2) 2014
(3) 2015
(4) 2017
(5) Question not attempted

52. Which of the following is NOT one of the three core vision areas of the Digital India programme?
(1) Digital Infrastructure as a Core Utility to Every Citizen
(2) Governance and Services on Demand
(3) Digital Empowerment of Citizens
(4) Mandatory Digital Currency Usage
(5) Question not attempted

53. The Digital India Mission rests on Nine Pillars of growth. Which of the following represents one of these pillars?
(1) Eradication of printed currency
(2) Monopoly of state-owned telecom
(3) Broadband Highways
(4) Analog TV transmission
(5) Question not attempted

54. Identify the correct statement about the BharatNet project under the Digital India Mission.
(1) It aims to provide free smartphones to all rural households.
(2) It is the world's largest rural broadband connectivity programme using Optical Fibre.
(3) It focuses exclusively on connecting urban metropolitan cities.
(4) It is a satellite-based internet service for the Indian Armed Forces.
(5) Question not attempted

55. What is the primary function of the UMANG app developed under Digital India?
(1) To provide specialized educational video games for children
(2) To monitor the internet speed of rural broadband networks
(3) To manage and process international visa applications online
(4) To provide a single platform for accessing government services
(5) Question not attempted

56. Which of the following is a direct result of the Digital India initiative in the financial sector?
(1) Massive increase in digital peer-to-peer transactions via UPI
(2) Digital India mandated the closure of all physical bank branches
(3) Aadhaar integration resulted in the banning of cash transactions
(4) E-governance portals caused a significant decrease in literacy
(5) Question not attempted

57. Which cloud computing platform was launched by the Government of India under the Digital India initiative to host government applications and data?
(1) DigiLocker
(2) e-Pramaan
(3) MeghRaj
(4) MyGov
(5) Question not attempted

NODIA

58. Identify the exception among the targeted impacts of the Digital India Mission.
(1) Centralizing all state powers to the federal tech department
(2) Reducing paperwork through platforms like DigiLocker
(3) Promoting electronic manufacturing in India
(4) Improving transparency in governance
(5) Question not attempted

59. The Common Services Centres (CSCs) act as access points for delivery of essential public utility services. Under which pillar of Digital India do they primarily fall?
(1) Universal Access to Mobile Connectivity
(2) Early Harvest Programmes
(3) IT for Jobs
(4) Public Internet Access Programme
(5) Question not attempted

60. Consider the following pillars of Digital India:
I. e-Governance: Reforming Government through Technology
II. e-Kranti: Electronic Delivery of Services
III. Information for All
IV. Electronics Manufacturing
Which of the above represent the pillars of Digital India?
(1) I and II only
(2) I, II, and III only
(3) II, III, and IV only
(4) I, II, III, and IV
(5) Question not attempted

61. The National Education Policy (NEP) 2020 proposes the establishment of an apex body to catalyze and expand research and innovation across the country. What is its name?
(1) National Science Commission
(2) Innovation Council of India
(3) National Research Foundation
(4) Higher Education Financing Agency
(5) Question not attempted

62. Which structural reform in the school curriculum system does NEP 2020 propose, replacing the 10+2 system?
(1) 5+4+3+3
(2) 5+3+3+4
(3) 4+4+4+4
(4) 8+4+3
(5) Question not attempted

63. Under NEP 2020, from which stage is coding and computational thinking proposed to be introduced in schools?
(1) Middle Stage
(2) Preparatory Stage
(3) Foundational Stage
(4) Secondary Stage
(5) Question not attempted

64. Identify the correct statement regarding higher education under NEP 2020.
(1) The policy mandates the separation of science and arts disciplines at the undergraduate level.
(2) It aims to increase the Gross Enrolment Ratio in higher education to 50% by 2035.
(3) It abolishes the PhD degree system in Indian universities.
(4) All autonomous colleges will be converted into affiliated colleges within 15 years.
(5) Question not attempted

65. Match the bodies proposed in NEP 2020 in List I with their corresponding functions in List II.
List I: (Body)
A. NRF
B. PARAKH
C. HECI
D. NETF
List II: (Function)
i. National Assessment Centre
ii. Research funding and promotion
iii. Technology integration in education
iv. Single umbrella body for higher education
(1) A-ii, B-i, C-iv, D-iii
(2) A-i, B-ii, C-iii, D-iv
(3) A-ii, B-iv, C-i, D-iii
(4) A-iv, B-iii, C-ii, D-i
(5) Question not attempted

66. Which higher education degree programme is slated to be discontinued according to the NEP 2020?
(1) B.Ed
(2) M.Tech
(3) M.Phil
(4) Post-Doctoral Fellowship
(5) Question not attempted

Downloaded from www.pdf.tube

67. How does NEP 2020 envision the role of Artificial Intelligence (AI) and technology in education?
(1) Banning AI tools in classrooms to prevent any form of digital cheating
(2) Replacing human teachers with AI robots in primary schools by 2030
(3) Limiting internet access in schools to strictly monitored specific hours
(4) Establishing the NETF for ideas on technology use in education
(5) Question not attempted

68. In which year was the "Startup India" initiative launched to build a strong ecosystem for nurturing innovation and startups?
(1) 2014
(2) 2015
(3) 2016
(4) 2018
(5) Question not attempted

69. According to the Startup India policy, what is the maximum age limit for an entity to be considered a 'startup' from its date of incorporation or registration?
(1) 5 years
(2) 7 years
(3) 10 years
(4) 15 years
(5) Question not attempted

70. Consider the following statements regarding the benefits provided under the Startup India scheme:
I. Tax exemption on capital gains.
II. Income tax exemption for 3 consecutive years.
III. Fast-tracking of patent applications.
IV. 100% guarantee of success and government bailout.
V. 80% rebate on patent filing fees.
Which of the above statements is incorrect?
(1) I and II only
(2) III and V only
(3) IV only
(4) II, IV, and V only
(5) Question not attempted

71. Which institution manages the Fund of Funds for Startups (FFS) established under the Startup India initiative?
(1) Reserve Bank of India (RBI)
(2) State Bank of India (SBI)
(3) National Bank for Agriculture and Rural Development (NABARD)
(4) Small Industries Development Bank of India (SIDBI)
(5) Question not attempted

NODIA

72. Which of the following defines the primary objective of the Startup India Seed Fund Scheme (SISFS)?
(1) Providing funds for proof of concept and market entry
(2) Providing low-interest loans to large multinational corporations
(3) Funding all marketing expenses of recognized startups forever
(4) Offering agricultural subsidies to established rural farmers
(5) Question not attempted

73. Identify the odd one out among the pillars of the Startup India Action Plan.
(1) Simplification and Handholding
(2) Funding Support and Incentives
(3) Compulsory Government Acquisition of IP
(4) Industry-Academia Partnership and Incubation
(5) Question not attempted

74. Under the Startup India initiative, self-certification is permitted for compliance under various labour and environmental laws. For how many years from incorporation is this applicable?
(1) 1 to 2 years
(2) 3 to 5 years
(3) 7 to 10 years
(4) Lifetime of the startup
(5) Question not attempted

75. Select the correct order of the startup lifecycle support stages as envisioned in government policies:
(1) Seed funding → Incubation/Prototyping → Ideation → Scale-up
(2) Ideation → Incubation/Prototyping → Seed funding → Scale-up

(3) Scale-up → Ideation → Seed funding → Incubation
(4) Ideation → Scale-up → Incubation → Seed funding
(5) Question not attempted

76. In which year did the Union Cabinet approve the National Quantum Mission (NQM) for the development of quantum technologies?
(1) 2019
(2) 2021
(3) 2023
(4) 2024
(5) Question not attempted

77. Which central department is the nodal agency for implementing the National Quantum Mission?
(1) Department of Space
(2) Department of Atomic Energy
(3) Department of Science and Technology (DST)
(4) Ministry of Electronics and Information Technology (MeitY)
(5) Question not attempted

78. What is the target number of physical qubits for developing intermediate-scale quantum computers under the National Quantum Mission over 8 years?
(1) 10 to 20 qubits
(2) 50 to 1000 qubits
(3) 5000 to 10000 qubits
(4) Over 1 million qubits
(5) Question not attempted

79. The National Quantum Mission plans to establish four Thematic Hubs (T-Hubs). Which of the following is NOT one of the thematic areas?
(1) Quantum Biology
(2) Quantum Computing
(3) Quantum Communication
(4) Quantum Materials and Devices
(5) Question not attempted

80. The following question consists of two statements—Assertion (A) and Reason (R). Answer the question by selecting the appropriate option.
Assertion (A): The National Quantum Mission emphasizes the development of Quantum Key Distribution (QKD) technologies.
Reason (R): QKD provides a highly secure communication method based on the principles of quantum mechanics, making it resistant to classical hacking.
(1) Both A and R are true and R is the correct explanation of A.
(2) Both A and R are true but R is not the correct explanation of A.
(3) A is true but R is false.
(4) A is false but R is true.
(5) Question not attempted

81. Under the National Quantum Mission, satellite-based secure quantum communications are planned. What is the target range for these communications between ground stations within India?
(1) 100 kilometres
(2) 2000 kilometres
(3) 500 kilometres
(4) 10,000 kilometres
(5) Question not attempted

82. Which of the following correctly pairs a quantum technology with its core application in the National Quantum Mission?
(1) Quantum Sensing - High precision timing and navigation
(2) Quantum Materials - Designing traditional silicon chips
(3) Quantum Communication - Increasing the speed of optical fiber internet by 10%
(4) Quantum Computing - Running basic MS Word applications
(5) Question not attempted

83. What is the total estimated cost of the National Quantum Mission for the period 2023-24 to 2030-31?
(1) ₹1,500 crore
(2) ₹3,000 crore
(3) ₹6,000 crore
(4) ₹15,000 crore
(5) Question not attempted

84. Which statement about the National Green Hydrogen Mission is incorrect?
(1) It was approved by the Union Cabinet in early 2023.

Click Here to Buy book on Amazon

(2) Its nodal implementing agency is the Ministry of New and Renewable Energy (MNRE).
(3) It intends to make India a global hub for the production, use, and export of Green Hydrogen.
(4) It aims to produce grey hydrogen using coal gasification techniques.
(5) Question not attempted

85. Match the type of hydrogen in List I with its corresponding production method in List II.
List I: (Hydrogen Type)
A. Green Hydrogen
B. Grey Hydrogen
C. Blue Hydrogen
D. Brown Hydrogen
List II: (Production Method)
i. Coal gasification without carbon capture
ii. Electrolysis of water using renewable energy
iii. Natural gas reforming without carbon capture
iv. Natural gas reforming with carbon capture and storage
(1) A-i, B-ii, C-iii, D-iv
(2) A-ii, B-iv, C-iii, D-i
(3) A-ii, B-iii, C-iv, D-i
(4) A-iv, B-iii, C-ii, D-i
(5) Question not attempted

86. What is the targeted annual production capacity of Green Hydrogen in India by 2030 under the National Green Hydrogen Mission?
(1) 1 Million Metric Tonnes (MMT)
(2) 5 Million Metric Tonnes (MMT)
(3) 10 Million Metric Tonnes (MMT)
(4) 50 Million Metric Tonnes (MMT)
(5) Question not attempted

87. The SIGHT programme is a major financial incentive component of the National Green Hydrogen Mission. What does SIGHT stand for?
(1) Sustainable Incentives for Green Hydrogen Technologies
(2) Subsidy Initiative for Green Hydrogen Trade
(3) Standard Infrastructure for Green Hydrogen Testing
(4) Strategic Interventions for Green Hydrogen Transition
(5) Question not attempted

NODIA

88. Which two specific components are targeted for financial incentives under the Strategic Interventions for Green Hydrogen Transition (SIGHT) programme?
(1) Domestic manufacturing of electrolysers and production of Green Hydrogen
(2) Solar panel manufacturing and wind turbine installation
(3) Battery storage systems and electric vehicle manufacturing
(4) Coal liquefaction and natural gas extraction
(5) Question not attempted

89. Which industrial sectors are identified as the primary off-takers for initial Green Hydrogen adoption in India to replace fossil fuels?
(1) Aviation and textile industries
(2) IT parks and data centers
(3) Fertilizer production and petroleum refining
(4) Residential heating and cooking
(5) Question not attempted

90. Consider the following outcomes expected by 2030 from the National Green Hydrogen Mission:
I. Creation of over 6 lakh jobs.
II. Abatement of nearly 50 MMT of annual greenhouse gas emissions.
III. Complete cessation of all fossil fuel imports.
Which of the above statement(s) is/are correct?
(1) I and II only
(2) II and III only
(3) I and III only
(4) I, II, and III
(5) Question not attempted

91. The India Semiconductor Mission (ISM) operates as an independent business division within which entity?
(1) NITI Aayog
(2) Centre for Development of Advanced Computing (C-DAC)
(3) Bharat Electronics Limited (BEL)
(4) Digital India Corporation
(5) Question not attempted

92. What is the primary objective of the India Semiconductor Mission?
(1) To import all electronic components at zero duty for domestic design
(2) To build a vibrant semiconductor and

(4) By adopting multidisciplinary and inquiry-based learning
(5) Question not attempted

159. Identify the correct pair matching the government department or ministry with its flagship initiative.
(1) DST - National Quantum Mission
(2) MeitY - Atal Innovation Mission
(3) NITI Aayog - BioE3 Policy
(4) DBT - Digital India
(5) Question not attempted

160. The following question consists of two statements—Assertion (A) and Reason (R). Answer the question by selecting the appropriate option.
Assertion (A): The Green Hydrogen Mission relies heavily on the expansion of India's renewable energy capacity.
Reason (R): Green hydrogen is produced by the electrolysis of water, a process that must be powered by renewable energy sources to be classified as 'green'.
(1) Both A and R are true and R is the correct explanation of A.
(2) Both A and R are true but R is not the correct explanation of A.
(3) A is true but R is false.
(4) A is false but R is true.
(5) Question not attempted

161. Which portal under Digital India acts as a digital document wallet for citizens to store and access authentic documents and certificates?
(1) UMANG
(2) DigiLocker
(3) MyGov
(4) e-Hospital
(5) Question not attempted

162. What does the 'E3' stand for in the BioE3 policy recently launched by the Government of India?
(1) Economy, Environment, and Employment
(2) Energy, Education, and Empowerment
(3) Ecology, Equity, and Excellence
(4) Evolution, Ethics, and Ecosystems
(5) Question not attempted

163. What does the PM-WANI scheme, associated with the goals of Digital India, aim to proliferate?
(1) Rural banking branches
(2) Common Service Centres
(3) Public Wi-Fi Networks
(4) Digital healthcare records
(5) Question not attempted

164. Identify the incorrect statement regarding the Atmanirbhar Bharat Abhiyan.
(1) It translates to 'Self-reliant India campaign'.
(2) It was launched during the COVID-19 pandemic to stimulate the economy.
(3) It encompasses relief measures for MSMEs and agricultural sectors.
(4) It explicitly bans all forms of foreign direct investment in India.
(5) Question not attempted

165. Match the specialized institutions in List I with their corresponding primary focus area in List II.
List I: (Institution)
A. SERB
B. NIF
C. CDAC
D. AIM
List II: (Focus Area)
i. Supercomputing and advanced IT
ii. Funding basic scientific research
iii. Grassroots technological innovations
iv. Innovation and entrepreneurship ecosystem
(1) A-i, B-ii, C-iii, D-iv
(2) A-ii, B-iv, C-iii, D-i
(3) A-ii, B-iii, C-i, D-iv
(4) A-iv, B-iii, C-i, D-ii
(5) Question not attempted

166. Under the Make in India initiative, what strategy is primarily used to boost domestic manufacturing?
(1) Increasing import duties on raw materials and lowering them on finished goods
(2) Implementing PLI schemes across various key sectors
(3) Nationalizing major private manufacturing industries
(4) Making English the mandatory language in all factories
(5) Question not attempted

Downloaded from www.pdf.tube

(3) II, III, and IV only
(4) I, II, III, and IV
(5) Question not attempted

101. Which of the following best defines the concept of 'Circular Bioeconomy' emphasized in the BioE3 Policy?
(1) Extracting biological resources to produce single-use items for consumption
(2) The complete replacement of biological resources with synthetic chemicals
(3) Sustainable use of renewable biological resources to minimize waste
(4) Restricting the bioeconomy only to rural agricultural and forest areas
(5) Question not attempted

102. Which key global challenge does the BioE3 policy directly seek to mitigate through its push for biomanufacturing?
(1) Space debris accumulation
(2) Climate change and resource depletion
(3) Cybersecurity threats in banking
(4) Urban traffic congestion
(5) Question not attempted

103. The BioE3 policy focuses on shifting the manufacturing paradigm from:
(1) Bio-based to chemical-based processes
(2) Digital to analog systems
(3) Services to heavy machinery manufacturing
(4) Chemical-based to bio-based processes
(5) Question not attempted

104. Identify the correct pair matching the BioE3 thematic sector with its application.
(1) Functional foods and smart proteins - Addressing nutritional security and sustainable dietary alternatives
(2) Bio-based chemicals and enzymes - Production of traditional petroleum diesel
(3) Precision biotherapeutics - Manufacturing of synthetic pesticides
(4) Carbon capture and utilization - Increasing atmospheric greenhouse gases
(5) Question not attempted

105. Match the following policies/missions in List I with their primary implementing department or ministry in List II.
List I: (Policy/Mission)
A. BioE3 Policy
B. National Quantum Mission
C. Green Hydrogen Mission
D. Semiconductor Mission
List II: (Implementing Department/Ministry)
i. Ministry of New and Renewable Energy
ii. Ministry of Electronics and Information Technology
iii. Department of Biotechnology
iv. Department of Science and Technology
(1) A-iv, B-iii, C-ii, D-i
(2) A-iii, B-ii, C-iv, D-i
(3) A-iii, B-iv, C-i, D-ii
(4) A-i, B-iv, C-iii, D-ii
(5) Question not attempted

NODIA

106. Which new institutional structures are proposed under the BioE3 Policy to bridge the gap between research and commercial scale-up?
(1) Biomanufacturing Hubs and Biofoundries
(2) IT Software Parks
(3) Nuclear Energy Reactors
(4) Thermal Power Plants
(5) Question not attempted

107. Which of the following is an odd one out regarding the strategic themes of the BioE3 Policy?
(1) High-value bio-based chemicals
(2) Climate resilient agriculture
(3) Smart proteins
(4) Deep-sea mineral mining
(5) Question not attempted

108. What is the fundamental rationale for establishing Bio-AI hubs under the BioE3 Policy?
(1) To build robots that can replace all farmers in the field for sowing
(2) To use AI to optimize research and biomanufacturing processes
(3) To regulate internet access for biotechnology companies in the country
(4) To develop chemical weapons using advanced artificial intelligence
(5) Question not attempted

109. What is the name of the flagship startup and innovation program launched by the Department of Information Technology and

(5) Question not attempted

126. What was the solar power capacity target set by the Rajasthan Solar Energy Policy 2019 to be achieved by the year 2024-25?
(1) 10 GW
(2) 20 GW
(3) 30 GW
(4) 50 GW
(5) Question not attempted

127. Out of the 30 GW target in the Rajasthan Solar Energy Policy 2019, what is the specific target for Utility/Grid Scale Solar Parks?
(1) 4 GW
(2) 10 GW
(3) 15 GW
(4) 24 GW
(5) Question not attempted

128. What exemption is provided to solar power projects under the Rajasthan Solar Energy Policy 2019 to promote investment?
(1) Exemption from GST on all solar panels (State share only)
(2) Electricity Duty exemption for a period of 10 years
(3) Complete waiver of income tax for the lifetime of the plant
(4) Exemption from the requirement of purchasing project land
(5) Question not attempted

129. Identify the nodal agency responsible for the registration and facilitation of renewable energy projects in Rajasthan.
(1) Rajasthan Renewable Energy Corporation Limited (RRECL)
(2) Rajasthan State Electricity Board (RSEB)
(3) Jaipur Vidyut Vitran Nigam Limited (JVVNL)
(4) Department of Science and Technology, Rajasthan
(5) Question not attempted

130. Consider the following targets defined under the Rajasthan Solar Energy Policy 2019 for the 30 GW total capacity:
I. 24 GW for Utility/Grid Scale Solar Parks
II. 4 GW for Distributed Solar Power Projects
III. 1 GW for Solar Rooftop Projects
Which of the above targets are correctly specified in the policy?
(1) I and II only
(2) II and III only
(3) I and III only
(4) I, II, and III
(5) Question not attempted

131. Which component of the Rajasthan Solar Energy Policy 2019 specifically deals with agricultural consumers?
(1) Mega Solar Parks
(2) Floating solar plants exclusively
(3) Solarization of agriculture pumps (under PM-KUSUM)
(4) Rooftop solar on government buildings only
(5) Question not attempted

132. What is the policy's stance on the stamp duty for land allotment or purchase for setting up solar power projects in Rajasthan?
(1) Stamp duty is doubled to increase state revenue.
(2) Only a 10% concession is given.
(3) Stamp duty remains unchanged from standard commercial rates.
(4) 100% exemption on stamp duty is provided.
(5) Question not attempted

133. Which geographical region of Rajasthan is heavily focused on for developing massive Solar Parks due to high solar insolation and availability of wasteland?
(1) The eastern plains
(2) The Aravalli hilly ranges
(3) The western desert districts (Thar desert region)
(4) The Hadoti plateau
(5) Question not attempted

134. Identify the correct pair regarding the Rajasthan Solar Energy Policy 2019 components.
(1) Rooftop Solar - Target of 24 GW
(2) Solar Water Pumps - Target of 1 GW
(3) Utility Scale Projects - Target of 4 GW
(4) Distributed Solar - Target of 10 GW
(5) Question not attempted

135. Given that Rajasthan offers 100% exemption on transmission and wheeling charges for setting up solar power projects for captive use within

Click Here to Buy book on Amazon

(4) Statement I is false but Statement II is true
(5) Question not attempted

118. Which state-wide network provides connectivity up to the Gram Panchayat level in Rajasthan?
(1) Raj-Connect
(2) RajNET
(3) Desert-Net
(4) Aravalli-Fibre
(5) Question not attempted

119. What is the overarching vision of the Rajasthan IT/ITeS Policy?
(1) To shut down manual government services abruptly across the state
(2) To limit IT education only to top engineering colleges in cities
(3) To heavily tax IT startups to generate high state revenue
(4) To make Rajasthan a preferred destination for IT investments
(5) Question not attempted

120. The following question consists of two statements—Assertion (A) and Reason (R). Answer the question by selecting the appropriate option.
Assertion (A): The Rajasthan IT Policy provides incentives such as land allotment at concessional rates and electricity duty exemption to IT/ITeS companies.
Reason (R): These incentives are designed to attract investments, reduce operational costs for companies, and boost the local digital economy.
(1) Both A and R are true and R is the correct explanation of A.
(2) Both A and R are true but R is not the correct explanation of A.
(3) A is true but R is false.
(4) A is false but R is true.
(5) Question not attempted

121. What is the name of the flagship e-governance platform of Rajasthan that offers various G2C and B2C services to citizens under a single roof?
(1) Sampark
(2) RajKaj
(3) e-Mitra
(4) SSO (Single Sign-On)
(5) Question not attempted

122. Which portal acts as the centralized grievance redressal system for citizens under the digital initiatives of the Rajasthan government?
(1) Rajasthan Sampark
(2) Rajasthan e-Mitra
(3) Rajasthan SSO
(4) Raj-Grievance
(5) Question not attempted

123. Under the Rajasthan IT ecosystem, what is the utility of the Rajasthan Single Sign-On (SSO) identity?
(1) It acts as a digital currency wallet for all state taxes
(2) It is a mandatory smart card issued for public transport systems
(3) It replaces the Aadhaar card for all national and local uses
(4) It provides a unique digital identity for accessing multiple apps
(5) Question not attempted

124. Identify the incorrect statement regarding Rajasthan's digital infrastructure.
(1) RajNET facilitates connectivity through VSAT, leased lines, and broadband.
(2) Rajasthan has completely banned the use of cloud computing for state data.
(3) e-Mitra Plus kiosks are automated service delivery machines like ATMs.
(4) The state government operates a State Data Centre (SDC) to securely host data.
(5) Question not attempted

125. Match the Rajasthan Government digital initiatives in List I with their utility in List II.
List I: (Digital Initiative)
A. e-Mitra
B. Rajasthan Sampark
C. RajKaj
D. Raj eVault
List II: (Utility)
i. Integrated platform for government employees' workflow
ii. Secure digital document storage
iii. Citizen service delivery network
iv. Public grievance redressal portal
(1) A-iv, B-iii, C-ii, D-i
(2) A-iii, B-i, C-iv, D-ii
(3) A-iii, B-iv, C-i, D-ii
(4) A-ii, B-iv, C-iii, D-i

Downloaded from www.pdf.tube

display ecosystem in India
(3) To exclusively manufacture legacy nodes (above 65nm) for domestic use
(4) To train software engineers in advanced web development and coding
(5) Question not attempted

93. Under the modified scheme for setting up Semiconductor Fabs in India, what percentage of the project cost is offered as fiscal support by the Central Government on a pari-passu basis?
(1) 25%
(2) 30%
(3) 50%
(4) 75%
(5) Question not attempted

94. The acronym OSAT, commonly used in the semiconductor industry and targeted by the India Semiconductor Mission, stands for:
(1) Optical Sensor and Technology
(2) Operational Systems and Advanced Technologies
(3) Open Source Assembly Testing
(4) Outsourced Semiconductor Assembly and Test
(5) Question not attempted

95. Arrange the following stages of semiconductor manufacturing in the correct logical sequence:
I. Assembly, Testing, Marking, and Packaging (ATMP)
II. Wafer Fabrication
III. Integrated Circuit (IC) Design
(1) II, I, III
(2) III, II, I
(3) I, II, III
(4) III, I, II
(5) Question not attempted

96. What is the purpose of the Design Linked Incentive (DLI) scheme under the India Semiconductor Mission?
(1) To incentivize the physical construction of massive fabrication plants
(2) To offer financial incentives and infrastructure for chip design
(3) To subsidize the purchase of high-end smartphones by consumers
(4) To fund the export of raw materials like high-grade silicon sand
(5) Question not attempted

97. Identify the exception. The India Semiconductor Mission provides fiscal support for setting up facilities in all of the following domains EXCEPT:
(1) Traditional internal combustion engine assembly lines
(2) Silicon CMOS Semiconductor Fabs
(3) Display Fabs
(4) Compound Semiconductors / Silicon Photonics
(5) Question not attempted

98. Given below are two statements regarding semiconductors.
Statement I: Compound semiconductors (like Gallium Nitride and Silicon Carbide) are critical for high-power and high-frequency applications, such as electric vehicles and 5G.
Statement II: The India Semiconductor Mission does not provide any incentives for compound semiconductor facilities.
In light of the above statements, choose the correct answer from the options given below:
(1) Both Statement I and Statement II are true
(2) Both Statement I and Statement II are false
(3) Statement I is true but Statement II is false
(4) Statement I is false but Statement II is true
(5) Question not attempted

99. The BioE3 Policy, approved in 2024, stands for Biotechnology for:
(1) Energy, Education, and Empowerment
(2) Ecology, Evolution, and Earth
(3) Economy, Environment, and Employment
(4) Engineering, Ethics, and Ecosystems
(5) Question not attempted

NODIA

100. Consider the following statements about the BioE3 Policy:
I. It is piloted by the Department of Biotechnology.
II. It promotes high-performance biomanufacturing.
III. It aims to accelerate the transition to a circular bioeconomy.
IV. It seeks to establish Bio-AI hubs.
Which of the above statements are correct?
(1) I and II only
(2) I, III, and IV only

the state, which of the following is the most likely outcome?
(1) Decreased interest of local industries in solar power usage
(2) A massive surge in imported coal consumption in the state
(3) Complete shutdown of the state power grid infrastructure
(4) Local industries adopting solar power to reduce costs
(5) Question not attempted

136. In which year was the Department of Science and Technology, Government of Rajasthan, established?
(1) 1971
(2) 1983
(3) 1995
(4) 2003
(5) Question not attempted

137. What is the primary role of the Rajasthan State Council for Science & Technology?
(1) To manage agricultural subsidies for the farming community
(2) To regulate the IT companies operating in the state zones
(3) To advise the state government on development through S&T
(4) To solely fund the higher education universities in the state
(5) Question not attempted

138. Where is the State Remote Sensing Application Centre (SRSAC), a key institution under the Rajasthan Department of Science and Technology, located?
(1) Jodhpur
(2) Jaipur
(3) Udaipur
(4) Bikaner
(5) Question not attempted

139. Which of the following initiatives is undertaken by the Rajasthan Department of Science and Technology to promote scientific temper among students and the general public?
(1) Banning traditional agricultural practices in rural districts
(2) Mandating IT degrees for all state government employees
(3) Abolishing science fairs in schools to focus on exams
(4) Setting up Science Parks and Regional Science Centres
(5) Question not attempted

140. Consider the following initiatives under the Rajasthan Department of Science and Technology:
I. Patent Information Centre (PIC)
II. State Remote Sensing Application Centre (SRSAC)
III. Science Parks
IV. e-Mitra Kiosks
Which of the above correctly identifies programs or institutions directly under DST Rajasthan?
(1) I, II, and III only
(2) II, III, and IV only
(3) I and III only
(4) I, II, III, and IV
(5) Question not attempted

141. What is the main function of the Patent Information Centre (PIC) established by the Rajasthan Department of Science and Technology?
(1) To issue driving licenses for various vehicle categories
(2) To regulate foreign technology imports into Rajasthan zones
(3) To facilitate patent filing and IPR awareness in the state
(4) To provide seed funding for all registered IT startups
(5) Question not attempted

142. Given below are two statements regarding science and technology in Rajasthan.
Statement I: The Rajasthan State Science and Technology Award is given to recognize outstanding contributions by scientists native to or working in Rajasthan.
Statement II: The award aims to discourage brain drain and foster a local research ecosystem.
In light of the above statements, choose the correct answer from the options given below:
(1) Both Statement I and Statement II are true
(2) Both Statement I and Statement II are false
(3) Statement I is true but Statement II is false
(4) Statement I is false but Statement II is true
(5) Question not attempted

Click Here to Buy book on Amazon

Communication (DOIT&C), Government of Rajasthan?
(1) Raj-Innovate
(2) Desert Startups
(3) iStart Rajasthan
(4) Arohan Rajasthan
(5) Question not attempted

110. Consider the following facilities/programs under iStart Rajasthan:
I. Bhamashah Techno Hub
II. QRate Assessment
III. iStart Nest Incubators
IV. Challenge for Change
V. Rural iStart
Which of the above represent valid initiatives of the iStart Rajasthan program?
(1) I, II, and III only
(2) II, III, IV, and V only
(3) I, IV, and V only
(4) I, II, III, IV, and V
(5) Question not attempted

111. What is the primary purpose of the "QRate" mechanism under the Rajasthan iStart program?
(1) Providing an assessment framework for startups to gauge readiness
(2) To rate the quality of internet speed in various rural areas
(3) To evaluate the performance of state government employees
(4) To determine the tax liability of multinational IT firms
(5) Question not attempted

112. Where is the "Bhamashah Techno Hub", one of India's largest startup incubators built by the Rajasthan Government, located?
(1) Jodhpur
(2) Jaipur
(3) Udaipur
(4) Kota
(5) Question not attempted

113. Identify the correct statement regarding the financial assistance provided under iStart Rajasthan.
(1) Recognized startups can receive a sustenance allowance for one year
(2) Startups are strictly forbidden from receiving any direct financial grants
(3) Only startups founded by foreign nationals are eligible for seed funding
(4) Funding is provided only in the form of high-interest state loans
(5) Question not attempted

114. How does the iStart Rajasthan program specifically support women-led startups or those led by marginalized sections?
(1) By offering them significantly higher interest rates on startup loans
(2) By restricting their entry to specific sectors like the textile industry
(3) By providing additional financial incentives or allowance top-ups
(4) By exempting them from participating in mandatory pitch events
(5) Question not attempted

115. Which initiative under the Rajasthan IT department invites startups to partner with the State Government to provide IT solutions to various departmental challenges?
(1) Raj-Mastermind
(2) Hack-Rajasthan
(3) Code4Raj
(4) Challenge for Change
(5) Question not attempted

NODIA

116. Which of the following is NOT a feature of the iStart Nest incubators?
(1) Plug-and-play office space
(2) Mentorship and networking support
(3) Access to investor pitch sessions
(4) Guaranteed permanent government jobs for all founders
(5) Question not attempted

117. Given below are two statements regarding the iStart Rajasthan platform.
Statement I: The iStart Rajasthan platform provides a single-window clearance for startups to register and access benefits.
Statement II: Startups must physically visit multiple government offices in Jaipur to get their iStart recognition.
In light of the above statements, choose the correct answer from the options given below:
(1) Both Statement I and Statement II are true
(2) Both Statement I and Statement II are false
(3) Statement I is true but Statement II is false

Electronics and Information Technology.
Which of the above statements are correct?
(1) I, II, III, and IV only
(2) II, III, IV, and V only
(3) I, II, and V only
(4) I, III, IV, and V only
(5) Question not attempted

151. Which mechanism under the National Education Policy 2020 aims to seed, grow, and facilitate research at academic institutions across the country?
(1) Indian Council of Historical Research
(2) University Grants Commission
(3) All India Council for Technical Education
(4) National Research Foundation
(5) Question not attempted

152. Under the Startup India initiative, what specific benefit is offered to recognized startups regarding public procurement?
(1) Exemption from prior experience and turnover criteria
(2) Mandatory awarding of all public tenders to startups
(3) Direct tax discounts for all winning tender bids
(4) Restriction on startups from joining public procurement
(5) Question not attempted

153. Which specific scheme under the Startup India ecosystem addresses the prototype development costs of hardware tech startups via early-stage funding?
(1) PM Mudra Yojana
(2) Fund of Funds for Startups (FFS)
(3) Startup India Seed Fund Scheme (SISFS)
(4) Atal Pension Yojana
(5) Question not attempted

154. What constitutes the 'National Innovation Portal' developed by the National Innovation Foundation (NIF)?
(1) A repository of grassroots innovations and traditional knowledge
(2) A database of imported technological tools for domestic use
(3) A portal for downloading foreign academic science journals
(4) A state-level grievance registration system for urban citizens
(5) Question not attempted

155. Arrange the following components of the Startup India framework in the correct logical sequence of an entrepreneur's journey:
I. Utilizing the Fund of Funds for scaling
II. Registration on the Startup India Portal
III. Applying for Seed Fund for prototyping
IV. Obtaining DPIIT recognition
(1) II, IV, III, I
(2) IV, II, I, III
(3) II, III, IV, I
(4) III, II, IV, I
(5) Question not attempted

156. In the context of the India Semiconductor Mission, what is the role of the 'Design Linked Incentive (DLI)' scheme?
(1) To encourage the aesthetic design of consumer electronics
(2) To support the chip design ecosystem with financial aid
(3) To import silicon wafers at a significant discounted rate
(4) To train industrial designers for automobile manufacturing
(5) Question not attempted

157. Which specific problem does the 'One Nation, One Subscription' initiative under STIP 2020 aim to solve?
(1) The high cost of mobile internet plans across the country
(2) The fragmented OTT platform subscriptions in India today
(3) High journal subscription costs for Indian researchers
(4) The high fees of private universities for science students
(5) Question not attempted

158. How does the National Education Policy (NEP) 2020 envision altering the pedagogy for science education in schools?
(1) By focusing solely on rote memorization of formulas
(2) By removing science from the curriculum until the 8th grade
(3) By segregating science students from arts students at age 10

Downloaded from www.pdf.tube

143. Which of the following correctly describes the utility of the State Remote Sensing Application Centre (SRSAC) for state planning in Rajasthan?
(1) Providing GIS mapping for development and urban planning
(2) It conducts archaeological excavations for ancient sites
(3) It acts as the primary weather forecasting agency for airlines
(4) It manufactures solar panels for all rural electrification
(5) Question not attempted

144. Identify the odd one out among the popular Science Parks/Centres developed under the state Department of Science and Technology framework.
(1) Science Park, Jaipur
(2) Regional Science Centre, Dharwad
(3) Science Park, Jhalawar
(4) Sub-Regional Science Centre, Jodhpur
(5) Question not attempted

145. Match the key concepts in List I with their respective parent policy or mission in List II.
List I: (Key Concept)
A. Scientific Temper
B. Open Science Framework
C. Atal Tinkering Labs
D. Positive Indigenization Lists
List II: (Policy/Mission)
i. STIP 2020
ii. Atal Innovation Mission
iii. Atmanirbhar Bharat
iv. SPR 1958
(1) A-iv, B-i, C-ii, D-iii
(2) A-i, B-iv, C-ii, D-iii
(3) A-iv, B-ii, C-i, D-iii
(4) A-ii, B-i, C-iv, D-iii
(5) Question not attempted

146. Which fundamental principle differentiates the Science, Technology and Innovation Policy (STIP) 2020 from the Science and Technology Policy (STP) 2013?
(1) STP 2013 focused on open science, while STIP 2020 privatized all research data.
(2) STP 2013 was entirely focused on traditional medicine, while STIP 2020 bans it.
(3) STIP 2020 adopts a decentralized, bottom-up policy approach
(4) STIP 2020 focuses only on military technology development.
(5) Question not attempted

147. Under which mission would a researcher primarily seek institutional incubation support alongside technical mentorship for a science-based deep-tech startup?
(1) National Green Hydrogen Mission
(2) PM KUSUM
(3) Digital India (via BharatNet)
(4) Atal Innovation Mission (via AICs)
(5) Question not attempted

NODIA

148. Which exception exists in the "Make in India" Foreign Direct Investment (FDI) policy framework regarding the defence sector?
(1) 100% FDI is allowed under the automatic route for all cases.
(2) No FDI is permitted in any form of defence manufacturing.
(3) Automatic FDI up to 74% and 100% with government approval
(4) Foreign companies must transfer all IP to the government.
(5) Question not attempted

149. Identify the incorrect statement regarding the Council of Scientific and Industrial Research (CSIR) network.
(1) It encompasses 37 national laboratories.
(2) It is a purely academic degree-granting university with no industrial tie-ups.
(3) It is primarily funded by the Ministry of Science and Technology.
(4) It awards the Shanti Swarup Bhatnagar Prize.
(5) Question not attempted

150. Consider the following statements regarding the National Green Hydrogen Mission and the BioE3 Policy:
I. Both aim to reduce India's reliance on imported fossil fuels.
II. Green Hydrogen is produced using renewable energy electrolysis.
III. BioE3 focuses on using biological processes and biomanufacturing.
IV. Both policies promote the transition towards a sustainable, low-carbon economy.
V. Both are implemented by the Ministry of

167. Which of the following is an application of Quantum Sensing as envisioned under the National Quantum Mission?
(1) Standard web browsing and basic internet connectivity
(2) Creating graphic designs for high-end video games
(3) Storing cloud data for international social media
(4) Accurate atomic clocks for precise navigation
(5) Question not attempted

168. Given below are two statements regarding innovation initiatives.
Statement I: The Atal Tinkering Labs (ATLs) provide funding to higher educational institutions to set up world-class incubation facilities.
Statement II: Atal Incubation Centres (AICs) are set up in schools to foster curiosity and innovation in young minds.
In light of the above statements, choose the correct answer from the options given below:
(1) Both Statement I and Statement II are true
(2) Both Statement I and Statement II are false
(3) Statement I is true but Statement II is false
(4) Statement I is false but Statement II is true
(5) Question not attempted

169. Find the odd one out among the themes associated with the National Green Hydrogen Mission.
(1) Electrolyser manufacturing
(2) Renewable energy capacity addition
(3) Deep space satellite propulsion
(4) Decarbonization of heavy industries
(5) Question not attempted

170. Consider the following benefits under the Rajasthan iStart program:
I. Sustenance allowance of Rs 10,000 to Rs 15,000 per month.
II. Marketing assistance up to Rs 10 Lakh.
III. Completely tax-free status for 15 years.
Which of the above benefits are correctly associated with the iStart policy?
(1) I and II only
(2) II and III only
(3) I and III only
(4) I, II, and III
(5) Question not attempted

171. What is the specific objective of the 'Rural iStart' program in Rajasthan?
(1) To relocate urban tech companies to villages forcefully
(2) To provide agricultural subsidies to established farmers
(3) To digitize all land records in rural areas
(4) Fostering grassroots innovation in rural districts
(5) Question not attempted

172. What is the fundamental purpose of the Rajasthan 'Challenge for Change' initiative?
(1) To challenge students in state-wide sports competitions
(2) Inviting startups to solve state administrative challenges
(3) To privatize the state police force and traffic control
(4) To change the syllabus of higher education universities
(5) Question not attempted

173. Which of the following portals serves as an integrated state-level job matching platform developed by the Rajasthan IT department?
(1) Raj-Gyan
(2) Raj-Sampark
(3) Raj-Kaushal
(4) e-Mitra
(5) Question not attempted

174. Identify the correct statement regarding Rajasthan's Solar Energy Policy 2019.
(1) It discourages the integration of solar power with agricultural pumps.
(2) It provides no exemptions on electricity duty or cross-subsidy surcharges.
(3) It solely focuses on rooftop solar, ignoring utility-scale parks.
(4) Developing a 30,000 MW capacity by the year 2024-25
(5) Question not attempted

175. Why does the Rajasthan Government provide a 100% exemption on stamp duty for land purchased for solar parks under the Solar Energy Policy 2019?
(1) Reducing capital expenditure to attract

Click Here to Buy book on Amazon

(2) ICAR
(3) ISRO
(4) DRDO
(5) Question not attempted

192. Which scheme was introduced to foster a culture of innovation by connecting school students with scientists across India?
(1) INSPIRE
(2) JIGYASA
(3) NIDHI
(4) VIGYAN JYOTI
(5) Question not attempted

193. The Traditional Knowledge Digital Library (TKDL), which prevents the grant of incorrect patents on Indian traditional systems of medicine, is a joint venture of CSIR and:
(1) Ministry of AYUSH
(2) Ministry of Science and Technology
(3) Ministry of Health and Family Welfare
(4) Ministry of Environment, Forest and Climate Change
(5) Question not attempted

194. Identify the correct statement regarding the Council of Scientific and Industrial Research (CSIR).
(1) It was established post-independence in 1958.
(2) It solely focuses on agricultural research.
(3) It is known for sequencing the first Indian human genome.
(4) The President of India is its ex-officio President.
(5) Question not attempted

195. If a student team from a rural Rajasthan school develops a novel herbal pesticide, which organization is best suited to help them validate and protect their innovation?
(1) India Semiconductor Mission
(2) Department of Atomic Energy
(3) ISRO
(4) National Innovation Foundation (NIF)
(5) Question not attempted

196. Which of the following is an exception to the sectors supported under the Production Linked Incentive (PLI) scheme?
(1) Large Scale Electronics Manufacturing
(2) Pharmaceuticals
(3) Artisanal handloom weaving without industrial scale
(4) High Efficiency Solar PV Modules
(5) Question not attempted

197. Why was the 'PM e-VIDYA' programme initiated as part of the Atmanirbhar Bharat package?
(1) To provide free laptops to all college students in India
(2) Enabling multi-mode access to digital and online education
(3) To ban foreign educational software programs in India
(4) To replace physical schools permanently with digital ones
(5) Question not attempted

198. Given below are two statements regarding the BioE3 Policy.
Statement I: The BioE3 policy emphasizes the shift from an economy based heavily on fossil fuels to a circular bioeconomy.
Statement II: Biomanufacturing under BioE3 aims to utilize biological systems, like engineered microbes, to produce materials and chemicals sustainably.
In light of the above statements, choose the correct answer from the options given below:
(1) Both Statement I and Statement II are true
(2) Both Statement I and Statement II are false
(3) Statement I is true but Statement II is false
(4) Statement I is false but Statement II is true
(5) Question not attempted

199. Find the odd one out among the benefits available to an iStart recognized startup in Rajasthan.
(1) Sustenance allowance
(2) Marketing assistance
(3) Incubation space at Bhamashah Techno Hub
(4) Guaranteed public election tickets for founders
(5) Question not attempted

NODIA

200. The following question consists of two statements—Assertion (A) and Reason (R). Answer the question by selecting the appropriate option.
Assertion (A): The Rajasthan Solar Energy Policy

STUDYING FROM PDFs?

THINK AGAIN.

If you are studying only from PDFs,
you are wasting valuable time.

Research shows that learning from

PRINTED BOOKS has up to

4× HIGHER RETENTION

than studying from screens.

PRINT BOOK = BETTER MEMORY

PDF = LOWER RETENTION

Those who study from **PRINTED BOOKS**
move **AHEAD.**

Others are left **BEHIND**
in competition.

In competitive exams,
being average is not enough.

STAY ONE STEP AHEAD.

(3) STIP 2020 - Rajiv Gandhi
(4) STP 2003 - Atal Bihari Vajpayee
(5) Question not attempted

184. The 'KIRAN' scheme under the Department of Science and Technology (DST) is primarily focused on which area?
(1) Promoting women in science and gender parity in R&D
(2) Bringing back Indian scientists from abroad
(3) Funding high school laboratories across India
(4) Commercializing defence technologies in the market
(5) Question not attempted

185. Match the following elements of India's innovation ecosystem in List I with their corresponding defining characteristic in List II.
List I: (Innovation Element)
A. Atal Tinkering Labs
B. Startup India Seed Fund
C. Make in India PLI
D. BioE3 Policy
List II: (Characteristic)
i. Proof of concept funding
ii. School-level innovation workspaces
iii. High-performance biomanufacturing
iv. Domestic manufacturing incentives
(1) A-i, B-ii, C-iii, D-iv
(2) A-ii, B-iv, C-i, D-iii
(3) A-ii, B-i, C-iv, D-iii
(4) A-iv, B-i, C-ii, D-iii
(5) Question not attempted

186. Which of the following is NOT a recognized pillar of the Digital India Mission?
(1) Mandatory Cryptocurrencies
(2) Universal Access to Mobile Connectivity
(3) Broadband Highways
(4) e-Kranti
(5) Question not attempted

187. What is the main application of 'Quantum Key Distribution (QKD)', a focus area of the National Quantum Mission?
(1) Enhancing the graphics processing in computers
(2) Increasing the physical storage capacity of hard drives
(3) Generating renewable energy from quantum particles
(4) Ensuring ultra-secure, unhackable communication channels
(5) Question not attempted

188. If the Semiconductor Mission offers 50% fiscal support for setting up ATMP/OSAT facilities in India, what is the most direct expected economic outcome?
(1) A decrease in software engineering jobs across the state
(2) Attracting global packaging firms to establish plants
(3) A ban on importing finished electronic goods to India
(4) The closure of existing electronics manufacturing in India
(5) Question not attempted

NODIA

189. Which of the following is an odd one out regarding the strategic themes of the BioE3 Policy?
(1) Biomanufacturing and Biofoundries
(2) Precision Biotherapeutics
(3) Smart Proteins and Functional Foods
(4) Nuclear Waste Management
(5) Question not attempted

190. Consider the following policies and their target timeframes:
I. Rajasthan Solar Energy Policy target of 30 GW by 2024-25.
II. National Green Hydrogen Mission target of 5 MMT by 2030.
III. National Quantum Mission implementation period 2023-2031.
IV. National Education Policy 2020 target for 50% GER in higher education by 2035.
V. Digital India launch year 2010.
Which of the above statements are correct?
(1) I, II, III, and IV only
(2) II, III, IV, and V only
(3) I, II, and IV only
(4) I, III, IV, and V only
(5) Question not attempted

191. The Rajasthan Department of Science and Technology operates the Patent Information Centre (PIC). Under which national framework is this typically supported?
(1) DST (Govt of India) / TIFAC

over several decades. The Council of Scientific and Industrial Research was established in 1942, followed by the Department of Science and Technology in 1971. The National Innovation Foundation was set up in 2000, and the Atal Innovation Mission was launched more recently in 2016.

36. (3) Micro Venture Innovation Fund (MVIF)
To provide financial support to grassroots innovators, the National Innovation Foundation established the Micro Venture Innovation Fund in collaboration with SIDBI. This fund is specifically designed to address the unique financing needs of small-scale innovations that may not qualify for traditional venture capital. It helps innovators bridge the gap between prototyping and commercialization, enabling them to scale their solutions.

37. (2) NIF assists grassroots innovators in filing patents to protect their intellectual property.
The National Innovation Foundation plays a proactive role in protecting the intellectual property of grassroots innovators. It provides legal and technical assistance to help them file patents for their unique creations both in India and abroad. This support ensures that the innovators retain ownership of their ideas and can benefit financially from their inventions while preventing unauthorized exploitation.

38. (2) 2014
The Make in India initiative was launched in 2014 with the goal of transforming the country into a global manufacturing hub. By encouraging both domestic and foreign companies to manufacture their products in India, the program seeks to boost economic growth and create millions of jobs. It focuses on improving infrastructure and simplifying regulations to attract significant industrial investments.

39. (1) Department for Promotion of Industry and Internal Trade (DPIIT)
The Department for Promotion of Industry and Internal Trade serves as the nodal agency for the implementation of the Make in India initiative. It is responsible for coordinating with various ministries and state governments to streamline processes and improve the ease of doing business. The department plays a key role in monitoring progress and addressing challenges faced by investors.

40. (1) Both A and R are true and R is the correct explanation of A.
The Make in India initiative has strategically increased Foreign Direct Investment limits across multiple sectors to attract global capital and modern technology. This move is based on the rationale that higher FDI inflows lead to significant technology transfers and strengthen domestic manufacturing capabilities. By integrating with global supply chains, India aims to enhance its industrial competitiveness and economic growth.

41. (3) New Tariffs
The Make in India initiative is built on four fundamental pillars: New Processes, New Infrastructure, New Sectors, and New Mindset. These pillars are designed to simplify regulations, develop world-class industrial corridors, and change the way the government interacts with the industry. New Tariffs are not considered one of these core pillars, as the focus is on facilitation rather than taxation.

42. (1) Providing financial incentives to attract large investments
The Production Linked Incentive scheme complements the Make in India initiative by offering financial rewards to companies based on their incremental production. These incentives are designed to attract large-scale investments in key sectors and encourage companies to expand their manufacturing operations in India. The scheme aims to make Indian products globally competitive and reduce the country's dependence on various imports.

43. (4) Self-reliance while remaining integrated globally
Atmanirbhar Bharat fundamentally emphasizes self-reliance without advocating for economic isolation. The vision is to build a strong, resilient economy that can produce essential goods and technologies domestically while continuing to participate in the global market. By strengthening internal capabilities, India seeks to contribute more effectively to the world economy and reduce vulnerabilities caused by global supply chain disruptions.

Downloaded from www.pdf.tube

2019 encourages the setting up of decentralized solar projects like solarization of tube wells and agriculture pumps.
Reason (R): Decentralized solar energy generation reduces transmission and distribution (T&D) losses and provides reliable daytime power to farmers.

(1) Both A and R are true and R is the correct explanation of A.
(2) Both A and R are true but R is not the correct explanation of A.
(3) A is true but R is false.
(4) A is false but R is true.
(5) Question not attempted

www.nodia.in

NODIA

government bodies to strengthen the national scientific and technological infrastructure.

18. (1) INSPIRE
The INSPIRE program is a flagship initiative designed to attract young talent to the study of science. It focuses on students at various levels, from schools to doctoral research. By providing scholarships and internships, the scheme encourages students to pursue careers in basic sciences and research, thereby ensuring a steady supply of skilled scientific manpower for the nation.

19. (3) It functions under the Ministry of Earth Sciences.
The Department of Science and Technology functions under the Ministry of Science and Technology, not the Ministry of Earth Sciences. As the nodal department, it is responsible for organizing and promoting scientific activities throughout India. It provides crucial funding for both fundamental and applied research in various academic and research institutions, supporting the overall development of the country.

20. (3) I, II, and IV only
The Department of Science and Technology manages several specialized schemes. NIDHI focuses on nurturing startups and innovations, while KIRAN empowers women scientists through various career opportunities. The Science and Engineering Research Board is a statutory body that promotes basic research. However, the INSPIRE scheme specifically supports education in natural and basic sciences rather than the humanities.

21. (3) CSIR
The Council of Scientific and Industrial Research is India's leading industrial research and development organization. It operates a vast network of laboratories located across the country, focusing on a wide range of scientific and technological areas. CSIR plays a vital role in developing innovative technologies that support industrial growth and address various national challenges in sectors like health and environment.

22. (2) Prime Minister of India
The organizational structure of the Council of Scientific and Industrial Research is headed by the Prime Minister of India, who serves as its ex-officio President. This high-level leadership ensures that the council's research priorities are aligned with national goals. The Minister of Science and Technology acts as the Vice President, overseeing the functional and administrative aspects of the organization.

23. (4) CSIR
The Shanti Swarup Bhatnagar Prize is one of India's most prestigious awards for outstanding contributions to science and technology. It is awarded annually by the Council of Scientific and Industrial Research to recognize the achievements of young Indian scientists. The prize covers multiple disciplines, including biological, chemical, and physical sciences, honoring the legacy of the first director general of the CSIR.

24. (1) Vikram Sarabhai Space Centre (VSSC)
While the National Physical Laboratory, National Chemical Laboratory, and Centre for Cellular and Molecular Biology are all part of the Council of Scientific and Industrial Research network, the Vikram Sarabhai Space Centre is not. VSSC is a major research center under the Indian Space Research Organisation. It focuses on the development of rocket and launch vehicle technology for India's space program.

25. (3) A-iv, B-i, C-iii, D-ii
India's premier research laboratories are strategically located across the country. The National Physical Laboratory is situated in New Delhi, while the National Chemical Laboratory is based in Pune. The National Environmental Engineering Research Institute operates from Nagpur, and the Centre for Cellular and Molecular Biology is located in Hyderabad. These centers conduct specialized research that contributes to national scientific advancement.

26. (1) Traditional Knowledge Digital Library (TKDL)
The Traditional Knowledge Digital Library is a collaborative initiative between the Council of Scientific and Industrial Research and the Ministry of AYUSH. Its primary goal is to

Click Here to Buy book on Amazon

9. (3) Eliminating intellectual property rights for basic research
The 2013 policy emphasized the importance of intellectual property rights as a tool for fostering innovation and protecting scientific discoveries. Rather than eliminating these rights, it sought to strengthen the IPR framework to encourage investment in research. Other focus areas included promoting gender parity, increasing private sector participation in research, and developing cost-effective solutions for various national challenges.

10. (1) I and II only
The Science, Technology and Innovation Policy of 2013 set a strategic goal to place India among the world's top five scientific powers by 2020. It also aimed to create a conducive environment for the private sector to invest more heavily in research and development. However, the policy did not prohibit foreign collaboration, but rather encouraged international scientific partnerships.

11. (4) Decentralized, bottom-up, and inclusive architecture
The Science, Technology and Innovation Policy of 2020 was formulated using a highly inclusive and participative process. It moved away from traditional centralized planning by adopting a decentralized, bottom-up approach. This architecture ensured that diverse stakeholders, including grassroots innovators and regional experts, contributed to the policy's design, making it more representative of the needs of the entire nation.

12. (2) 'One Nation, One Subscription' for scientific journals
A key feature of the Open Science Framework in the 2020 policy is the 'One Nation, One Subscription' initiative. This proposal aims to provide all individuals and institutions in India with free access to national and international scientific journals. By removing financial barriers to information, the policy seeks to democratize knowledge and empower researchers, students, and the general public.

13. (3) Equity and Inclusion - Mandates 30% women representation in committees
The 2020 policy places a strong emphasis on equity and inclusion within the scientific community. One of its specific structural features is the mandate for at least thirty percent representation of women in all selection and evaluation committees. This measure is intended to address gender imbalances and ensure that women play a significant role in decision-making processes in science.

14. (4) National Research Foundation (NRF)
To bolster research funding and coordination, the policy proposes the establishment of the National Research Foundation. This body is designed to seed, grow, and facilitate research across universities and colleges. By providing a centralized mechanism for funding, the foundation aims to build a robust research culture and bridge the gap between academia, government laboratories, and the private industry.

15. (1) SPR 1958 → TPS 1983 → STP 2003 → STIP 2013
India's scientific journey is marked by the sequential issuance of formal policy documents. It began with the Scientific Policy Resolution in 1958. This was followed by the Technology Policy Statement in 1983. The turn of the century saw the Science and Technology Policy in 2003, and the latest finalized document is the Science, Technology and Innovation Policy 2013.

16. (2) Providing journal access for all individuals and institutions in India
The 'One Nation, One Subscription' policy is intended to make scientific literature universally accessible within the country. Under this model, the government negotiates with publishers to provide a single central subscription. This outcome ensures that even researchers in remote areas or smaller institutions can access high-quality research papers without facing the burden of individual or institutional subscription fees.

17. (2) 1971
The Department of Science and Technology was established in 1971 to serve as a nodal agency for promoting science and technology in India. Since its inception, it has played a critical role in formulating policies and implementing programs that support research across various disciplines. The department coordinates with other

NODIA

ANSWERS

1. (2) To foster and sustain scientific research in all its various aspects
The Scientific Policy Resolution of 1958 represented a landmark commitment by the Indian government to promote scientific progress. It aimed to cultivate a scientific spirit among the people and ensure that the country could benefit from the vast potential of modern science. The resolution focused on developing research facilities and supporting scientists to achieve national self-reliance and development.

2. (1) Homi J. Bhabha
Homi J. Bhabha played a pivotal role in shaping India's scientific landscape during the post-independence era. He collaborated closely with Prime Minister Jawaharlal Nehru to draft the Scientific Policy Resolution of 1958. This foundational document emphasized the importance of science for national advancement and laid the groundwork for establishing various scientific institutions and research programs across the entire country.

3. (3) Supporting individual initiative for the acquisition of knowledge
The core vision of the 1958 resolution centered on encouraging individual creativity and initiative in the pursuit of scientific understanding. By fostering an environment where knowledge could be acquired and applied freely, the policy aimed to ensure that the benefits of science reached all citizens. This approach was considered essential for social transformation and overall national prosperity in India.

4. (4) It proposed a reduction in the remuneration of scientific workers to save government funds.
The Scientific Policy Resolution of 1958 actually aimed to improve the status and conditions of scientific workers rather than reducing their benefits. It sought to recognize their contribution to nation-building and provide them with an honorable place in society. The policy emphasized the acquisition and application of scientific knowledge to improve the quality of life for all Indian citizens.

5. (3) A-iii, B-iv, C-i, D-ii
India has evolved its scientific framework through several key policies over the decades. The first Scientific Policy Resolution was adopted in 1958, followed by the Technology Policy Statement in 1983. Later, the Science and Technology Policy was introduced in 2003 to address new challenges. Finally, the Science, Technology and Innovation Policy was implemented in 2013 to integrate innovation.

6. (2) Expanding the network of national laboratories and institutes
Following the adoption of the 1958 resolution, India witnessed a significant expansion of its scientific infrastructure. This led to the creation of numerous national laboratories and specialized research institutes across diverse fields. These institutions provided the necessary environment for researchers to conduct advanced work, ultimately strengthening the country's domestic capabilities in science and technology for long-term growth.

7. (4) Science, technology and innovation for the people
The Science, Technology and Innovation Policy of 2013 introduced a transformative paradigm that focused on societal benefits. It recognized that innovation must be directed toward solving the everyday problems of the common man. By linking scientific advancement with social needs, the policy aimed to ensure that the fruits of technological progress contributed directly to the welfare of the population.

8. (2) 2 percent
A major objective of the 2013 policy was to significantly increase the national investment in research and development activities. It set an ambitious target to raise the Gross Expenditure on Research and Development to two percent of the national Gross Domestic Product. Achieving this goal required enhanced participation from both the public and private sectors to drive technological innovation.

Downloaded from www.pdf.tube

document traditional Indian knowledge about medicinal plants and formulations in a digital format. This repository helps prevent the misappropriation of such knowledge through the grant of wrong patents in international patent offices.

27. (4) NITI Aayog
The Atal Innovation Mission was launched under the aegis of NITI Aayog to create a culture of innovation and entrepreneurship in India. It serves as an umbrella platform that promotes various initiatives across schools, universities, and industries. By providing institutional support and incentives, the mission aims to transform the country into a global hub for innovation and technological development.

28. (2) School students in grades 6 to 12
Atal Tinkering Labs are specifically designed to foster curiosity and creativity among young school students, primarily those in grades six to twelve. These labs provide students with access to modern tools and technologies, such as robotics and 3D printing. By encouraging hands-on learning and problem-solving, the labs aim to prepare the next generation of innovators and entrepreneurs.

29. (3) Atal Incubation Centres (AICs)
Atal Incubation Centres are established to support and nurture world-class startups by providing them with necessary infrastructure, mentorship, and networking opportunities. These centers play a crucial role in adding value to the startup ecosystem by helping entrepreneurs transform their ideas into successful businesses. They are located in universities, research institutes, and corporate bodies to facilitate industry-academia collaboration.

30. (3) I, II, III, IV, and V
The Atal Innovation Mission operates through several core initiatives designed to cover the entire innovation lifecycle. These include Atal Tinkering Labs for schools, Atal Incubation Centres for startups, and Atal New India Challenges for sector-specific innovations. Additionally, the Mentor India Campaign provides professional guidance, while Atal Grand Challenges focus on solving large-scale problems through technological interventions.

NODIA

31. (1) ARISE - Applied Research and Innovation for Small Enterprises
The ARISE initiative is a component of the Atal Innovation Mission that focuses on promoting applied research and innovation in small enterprises. It encourages MSMEs to develop solutions for challenges faced by various government departments. This program aims to boost domestic manufacturing and technological self-reliance by providing financial and technical support to small businesses for innovative projects.

32. (2) To support grassroots innovations and traditional knowledge
The National Innovation Foundation was established to identify and support grassroots innovations developed by individuals from the unorganized sector. It focuses on recognizing the creative potential of farmers, mechanics, and traditional knowledge holders. By providing technical and financial assistance, the foundation helps these innovators refine their ideas and bring them to the market, fostering inclusive national development.

33. (1) Department of Science and Technology
The National Innovation Foundation operates as an autonomous body under the Department of Science and Technology. This institutional arrangement allows the foundation to align its activities with the broader scientific and technological goals of the central government. It plays a unique role in the national innovation system by bridging the gap between formal research and informal grassroots creativity.

34. (3) IGNITE Awards
The IGNITE Awards are an annual national competition conducted by the National Innovation Foundation to encourage creativity and problem-solving among school children. In association with the Honey Bee Network, the awards recognize original technological ideas and innovations developed by students. This initiative aims to foster a culture of innovation from a young age by providing recognition and support.

35. (1) I, II, III, IV
The institutional framework for science and innovation in India has developed chronologically

investments
(2) Because stamp duty is illegal for any projects in Rajasthan
(3) Because solar parks are built on government land without purchase
(4) To discourage agricultural activities in wasteland zones
(5) Question not attempted

176. Which state government enterprise acts as the State Nodal Agency for setting up Renewable Energy projects in Rajasthan?
(1) Rajasthan State Industrial Development and Investment Corporation (RIICO)
(2) Rajasthan Renewable Energy Corporation Limited (RRECL)
(3) Rajasthan Finance Corporation (RFC)
(4) Rajasthan Vidyut Prasaran Nigam Limited (RVPNL)
(5) Question not attempted

177. If a startup founder in Rajasthan requires structured mentorship, investor connections, and an incubation space, to which specific facility in Jaipur should they apply?
(1) Bhamashah Techno Hub
(2) Secretariat IT Cell
(3) Rajasthan Solar Park
(4) State Remote Sensing Centre
(5) Question not attempted

178. Identify the incorrect statement regarding the 'QRate' program under the Rajasthan iStart initiative.
(1) It helps startups identify their strengths and weaknesses.
(2) It is an assessment framework.
(3) It automatically grants a 1 crore rupee loan to any startup that applies.
(4) It uses a scorecard mechanism to rank startups.
(5) Question not attempted

179. Given below are two statements regarding the Rajasthan Department of Science and Technology.
Statement I: The Department of Science and Technology, Rajasthan, runs the State Remote Sensing Application Centre (SRSAC).
Statement II: SRSAC utilizes satellite data for urban planning, agriculture monitoring, and disaster management in the state.
In light of the above statements, choose the correct answer from the options given below:
(1) Both Statement I and Statement II are true
(2) Both Statement I and Statement II are false
(3) Statement I is true but Statement II is false
(4) Statement I is false but Statement II is true
(5) Question not attempted

180. Consider the following digital initiatives by the Rajasthan Government:
I. e-Mitra
II. RajKaj
III. Rajasthan Sampark
IV. Single Sign-On (SSO)
Which of the above represent initiatives aimed at improving citizen service delivery and governance transparency?
(1) I and III only
(2) II, III, and IV only
(3) I, III, and IV only
(4) I, II, III, and IV
(5) Question not attempted

181. Under the Atmanirbhar Bharat Abhiyan, what was the primary focus of the reforms introduced in the space sector?
(1) Disbanding ISRO to save central government funds
(2) Halting all future planetary exploration missions
(3) Allowing private sector participation in space services
(4) Banning international space collaborations entirely
(5) Question not attempted

182. How does the National Innovation Foundation (NIF) recognize and encourage student innovators?
(1) Through the Shanti Swarup Bhatnagar Prize
(2) Through the IGNITE awards
(3) Through the JIGYASA program
(4) Through the KVPY fellowship
(5) Question not attempted

183. Which of the following correctly pairs a science policy with its corresponding historical Prime Minister?
(1) SPR 1958 - Indira Gandhi
(2) TPS 1983 - Jawaharlal Nehru

Click Here to Buy book on Amazon

44. (2) Economy, Infrastructure, System, Vibrant Demography, and Demand
The Atmanirbhar Bharat Abhiyan is supported by five essential pillars that drive national growth. These include a high-growth Economy, world-class Infrastructure, a technology-driven System, a Vibrant Demography, and a robust Demand for goods and services. Together, these pillars form the foundation for a self-reliant India, enabling the country to achieve sustainable development and enhanced global standing.

45. (3) A-ii, B-i, C-iv, D-iii
Several initiatives have been launched under the self-reliance framework to support different sectors. Positive Indigenization Lists target the defence sector to promote domestic production. Commercial mining reforms have been introduced in the coal sector, while PM e-VIDYA focuses on the education sector. Additionally, the Production Linked Incentive scheme is a key driver for growth in the manufacturing sector.

46. (4) They list items with import embargoes to promote domestic manufacturing.
Positive Indigenization Lists consist of specific defense items and technologies that the government has barred from being imported. By notifying these lists, the Ministry of Defence aims to provide a clear roadmap for the domestic industry to develop and manufacture these components within India. This strategy is crucial for achieving self-reliance in the critical area of national security.

47. (1) Creation of IN-SPACe to promote private space activities
As part of the Atmanirbhar Bharat reforms, the government created IN-SPACe to act as a facilitator and regulator for private sector participation in the space sector. This initiative allows private companies to utilize ISRO's facilities and engage in various space activities, including satellite launches and space-based services. The move aims to boost innovation and competitiveness in India's growing space economy.

48. (3) Statement I is true but Statement II is false
The government increased the FDI limit in defense manufacturing to seventy-four percent under the automatic route to encourage foreign original equipment manufacturers to set up production units in India. This step was intended to attract global investment and facilitate technology transfer. Therefore, the claim that this measure was meant to discourage foreign investors is incorrect; it was actually a major incentive.

49. (2) Privatization of all public sector banks immediately
The Atmanirbhar Bharat packages introduced major structural reforms, including the commercialization of coal mining and the liberalization of geospatial data policies. However, the immediate privatization of all public sector banks was not part of these specific reform measures. While banking reforms are ongoing, the focus of the package was on enhancing self-reliance and providing economic stimulus across various industrial sectors.

50. (1) I and II only
The Atmanirbhar Bharat package was a comprehensive response to the economic challenges posed by the COVID-19 pandemic. The total stimulus amounted to nearly ten percent of India's GDP, covering a wide range of relief measures and structural reforms. While it included food security initiatives, its primary focus extended to deep reforms in agriculture, industry, and governance to ensure long-term resilience.

51. (3) 2015
The Digital India Mission was officially launched in 2015 with the vision of transforming the country into a digitally empowered society. The program seeks to ensure that government services are made available to citizens electronically by improving online infrastructure and increasing internet connectivity. It represents a major step toward building a knowledge economy and bridging the digital divide across the nation.

52. (4) Mandatory Digital Currency Usage
The Digital India programme is based on three core vision areas: providing digital infrastructure as a utility to every citizen, delivering governance and services on demand, and ensuring the digital empowerment of all citizens. Mandatory digital currency usage is not a core vision area of the mission. The focus remains on creating

Downloaded from www.pdf.tube

applications and significant rebates on filing fees. However, the government does not provide a guarantee of success or a bailout for startups, as entrepreneurship inherently involves taking risks in a competitive market environment.

71. (4) Small Industries Development Bank of India (SIDBI)
The Fund of Funds for Startups is a key financial mechanism under the Startup India initiative, managed by the Small Industries Development Bank of India. The fund does not invest directly in startups but provides capital to venture capital funds that then invest in innovative companies. This structural approach helps leverage private capital and provides much-needed equity funding for the startup ecosystem.

72. (1) Providing funds for proof of concept and market entry
The Startup India Seed Fund Scheme is designed to provide financial assistance to startups at the very early stages of their development. Its primary objective is to support activities like proof of concept, prototype development, and product trials. By providing this initial funding, the scheme helps startups overcome the initial financial hurdles and prepare for market entry and further investment.

73. (3) Compulsory Government Acquisition of IP
The Startup India Action Plan is built on three main pillars: Simplification and Handholding, Funding Support and Incentives, and Industry-Academia Partnership and Incubation. Compulsory government acquisition of intellectual property is not a part of this framework. Instead, the initiative focuses on protecting the IP rights of startups and helping them file patents and trademarks to secure their innovations.

74. (2) 3 to 5 years
Under the Startup India initiative, recognized startups are allowed to self-certify their compliance with several labor and environmental laws for a period of three to five years. This measure is intended to reduce the regulatory burden and allow entrepreneurs to focus on building their businesses. By minimizing inspections and administrative hurdles, the government seeks to foster a more supportive business environment.

75. (2) Ideation → Incubation/Prototyping → Seed funding → Scale-up
The typical support lifecycle for a startup in government policy follows a logical progression. It begins with the Ideation stage, where the initial concept is formed. This is followed by Incubation and Prototyping to refine the product. Next, the startup seeks Seed Funding for early market entry, and finally, it moves into the Scale-up phase to expand its business operations significantly.

76. (3) 2023
The Union Cabinet approved the National Quantum Mission in 2023 to accelerate research and development in quantum technologies. This mission aims to position India as a global leader in this emerging field over the next several years. By investing in quantum computing, communication, and materials, the government seeks to drive future economic growth and enhance national security through advanced technology.

77. (3) Department of Science and Technology (DST)
The Department of Science and Technology serves as the nodal agency for implementing the National Quantum Mission. In this role, the department coordinates with various research institutions and industrial partners to achieve the mission's objectives. It is responsible for overseeing the development of quantum technologies and ensuring that the necessary infrastructure and funding are provided to support advanced scientific research.

78. (2) 50 to 1000 qubits
One of the primary goals of the National Quantum Mission is to develop intermediate-scale quantum computers with fifty to one thousand physical qubits over an eight-year period. These computers will utilize various platforms, such as superconducting and photonic systems. Achieving this target will enable India to perform complex computations that are beyond the reach of traditional classical computers, opening new frontiers in science.

79. (1) Quantum Biology
The National Quantum Mission plans to establish four thematic hubs to focus on key areas of quantum technology. These areas include Quantum Computing, Quantum

the research ecosystem. Its primary role is to coordinate and expand research and innovation across all disciplines in the country. By providing strategic funding and support, the foundation aims to foster a culture of research in universities and colleges nationwide.

62. (2) 5+3+3+4
The NEP 2020 introduces a new structural framework for school education, replacing the traditional ten-plus-two system with a five-plus-three-plus-three-plus-four model. This new structure is designed to align with the developmental stages of children, covering foundational, preparatory, middle, and secondary stages. The shift aims to provide a more holistic and flexible educational experience that focuses on cognitive development and critical thinking.

63. (1) Middle Stage
According to the National Education Policy 2020, coding and computational thinking are proposed to be introduced during the middle stage of school education. This stage typically covers students in grades six to eight. By introducing these skills early, the policy aims to prepare students for the demands of a digital world and foster problem-solving abilities from a young age.

64. (2) It aims to increase the Gross Enrolment Ratio in higher education to 50% by 2035.
One of the major goals of higher education under the NEP 2020 is to significantly increase the Gross Enrolment Ratio to fifty percent by the year 2035. The policy also emphasizes multidisciplinary education, allowing students to combine science with arts and other subjects. It seeks to create more flexible learning pathways and improve the overall quality and accessibility of higher education.

65. (1) A-ii, B-i, C-iv, D-iii
The NEP 2020 proposes several new bodies to oversee different aspects of education. The National Research Foundation focuses on research funding, while PARAKH acts as a national assessment center. The Higher Education Commission of India is designed as a single umbrella body for higher education. Additionally, the National Educational Technology Forum aims to integrate technology effectively into the learning process.

66. (3) M.Phil
Under the National Education Policy 2020, the Master of Philosophy degree programme is slated to be discontinued. This decision is part of the effort to streamline higher education degrees and focus more on research-intensive doctoral programs. The policy encourages students to move directly into Ph.D. programs after completing their four-year undergraduate degree or a master's degree, simplifying the academic progression.

67. (4) Establishing the NETF for ideas on technology use in education
The NEP 2020 envisions a central role for technology and Artificial Intelligence in enhancing education. To facilitate this, it proposes the establishment of the National Educational Technology Forum. This body will serve as a platform for the free exchange of ideas on the use of technology to improve learning, assessment, planning, and administration in the entire educational sector.

68. (3) 2016
The Startup India initiative was launched in 2016 to create a favorable ecosystem for nurturing innovation and supporting new businesses. The program offers various benefits, including tax exemptions and simplified regulations, to encourage entrepreneurship. By providing a platform for startups to thrive, the government aims to drive economic growth and generate large-scale employment opportunities across the country.

69. (3) 10 years
According to the Startup India policy, an entity is considered a startup for up to ten years from its date of incorporation or registration. This extended period allows new businesses to access various government benefits and support mechanisms as they grow and stabilize. Once an entity exceeds this age limit or reaches a specific turnover threshold, it no longer qualifies for the scheme.

70. (3) IV only
The Startup India scheme provides several benefits, including tax exemptions on capital gains and income tax for three consecutive years. It also offers fast-tracking of patent

Click Here to Buy book on Amazon

88. (1) Domestic manufacturing of electrolysers and production of Green Hydrogen
The SIGHT programme specifically targets two critical areas for financial incentives: the domestic manufacturing of electrolysers and the actual production of green hydrogen. These components are essential for building a complete green hydrogen ecosystem within the country. By supporting both manufacturing and production, the government aims to create a self-reliant industry that can meet both domestic and international demand for clean fuel.

89. (3) Fertilizer production and petroleum refining
For the initial adoption of green hydrogen in India, the government has identified fertilizer production and petroleum refining as the primary off-taker sectors. These industries currently use large amounts of hydrogen produced from fossil fuels. Replacing this with green hydrogen will lead to a significant reduction in industrial carbon emissions and help create a stable market for the emerging green hydrogen economy.

90. (1) I and II only
By 2030, the National Green Hydrogen Mission is expected to create over six lakh jobs and lead to a significant abatement of annual greenhouse gas emissions. While the mission aims to reduce the reliance on fossil fuel imports, it does not expect a complete cessation of all such imports within this timeframe. The focus remains on strategic decarbonization and building a sustainable energy future.

91. (4) Digital India Corporation
The India Semiconductor Mission functions as an independent business division within the Digital India Corporation. This arrangement provides the mission with the necessary autonomy and flexibility to manage the complex tasks of promoting the semiconductor ecosystem. By operating under the Ministry of Electronics and Information Technology, the mission can effectively coordinate various incentive schemes and international collaborations for chip manufacturing.

92. (2) To build a vibrant semiconductor and display ecosystem in India
The primary objective of the India Semiconductor Mission is to establish a comprehensive and sustainable semiconductor and display manufacturing ecosystem in India. This involves attracting investments for setting up fabrication units, design facilities, and assembly plants. By building this ecosystem, the government aims to achieve technological self-reliance, ensure supply chain security, and create high-tech employment opportunities for the country's skilled workforce.

93. (3) 50%
Under the modified semiconductor schemes, the central government offers fifty percent fiscal support for setting up semiconductor fabrication units in India. This support is provided on a pari-passu basis, meaning the government contributes alongside the private investors during the project's development. This high level of financial assistance is designed to make India an attractive destination for global semiconductor manufacturing giants.

94. (4) Outsourced Semiconductor Assembly and Test
OSAT stands for Outsourced Semiconductor Assembly and Test, a critical phase in the semiconductor supply chain. This process involves the final packaging and testing of semiconductor devices after they have been fabricated on wafers. The India Semiconductor Mission provides specific incentives to promote the establishment of OSAT facilities in India, as they are essential for creating a complete and localized semiconductor manufacturing ecosystem.

95. (2) III, II, I
Semiconductor manufacturing follows a specific logical sequence. It begins with the Integrated Circuit design phase, where the chip's architecture is planned. This is followed by Wafer Fabrication, a complex process of creating the physical circuits on silicon wafers. Finally, the chips undergo Assembly, Testing, Marking, and Packaging to prepare them for integration into various electronic devices and consumer products.

96. (2) To offer financial incentives and infrastructure for chip design
The Design Linked Incentive scheme is a key part of the India Semiconductor Mission that focuses on the chip design ecosystem. It provides

NODIA

Communication, Quantum Sensing and Metrology, and Quantum Materials and Devices. While quantum biology is an emerging field, it is not currently identified as one of the four primary thematic hubs under this specific national mission's initial structural framework.

80. (1) Both A and R are true and R is the correct explanation of A.
The National Quantum Mission emphasizes the development of Quantum Key Distribution because it offers a revolutionary way to secure communications. QKD uses the principles of quantum mechanics to create unhackable encryption keys, making communication resistant to even the most advanced classical hacking techniques. This technology is vital for protecting sensitive national data and ensuring secure government and commercial communications.

81. (2) 2000 kilometres
A key target of the National Quantum Mission is to establish satellite-based secure quantum communications over long distances. Specifically, the mission aims to achieve quantum communication between ground stations in India over a range of two thousand kilometers. This achievement would represent a major milestone in building a secure quantum network that can span the entire country for strategic applications.

82. (1) Quantum Sensing - High precision timing and navigation
The National Quantum Mission identifies several core applications for different quantum technologies. Quantum sensing is specifically targeted for high-precision timing and navigation systems, which are essential for both civilian and military purposes. These sensors utilize the extreme sensitivity of quantum states to measure various physical quantities with unprecedented accuracy, far exceeding the capabilities of traditional sensors used in current technology.

83. (3) ₹6,000 crore
The Government of India has allocated an estimated budget of six thousand crore rupees for the National Quantum Mission. this funding is intended for the period from 2023-24 to 2030-31. The investment will support extensive research, infrastructure development, and the establishment of thematic hubs to ensure that India remains at the forefront of the global quantum technology revolution.

84. (4) It aims to produce grey hydrogen using coal gasification techniques.
The National Green Hydrogen Mission focuses exclusively on promoting the production of green hydrogen, which is generated using renewable energy and water electrolysis. Producing grey hydrogen through coal gasification is not an objective of the mission, as it involves significant carbon emissions. The primary aim is to decarbonize the economy and make India a global leader in clean energy production and export.

85. (3) A-ii, B-iii, C-iv, D-i
Different types of hydrogen are classified based on their production methods. Green hydrogen is produced through the electrolysis of water using renewable energy. Grey hydrogen comes from natural gas reforming without carbon capture, while blue hydrogen uses the same process but includes carbon capture and storage. Brown hydrogen is generated through coal gasification without any measures to capture carbon emissions.

86. (2) 5 Million Metric Tonnes (MMT)
Under the National Green Hydrogen Mission, India has set a target to achieve a green hydrogen production capacity of five million metric tonnes per year by 2030. This ambitious goal is designed to help the country transition to a low-carbon economy and reduce its dependence on imported fossil fuels. Achieving this capacity will require significant scaling of renewable energy and electrolyser manufacturing.

87. (4) Strategic Interventions for Green Hydrogen Transition
SIGHT stands for Strategic Interventions for Green Hydrogen Transition, which is a key financial incentive component of the national mission. This program is designed to provide the necessary support to drive the initial adoption and production of green hydrogen. By offering targeted incentives, the government aims to overcome the high costs associated with new technologies and accelerate the transition to clean energy.

Downloaded from www.pdf.tube

environmental footprint compared to traditional animal-based agriculture, contributing to a more resilient and sustainable food system for India's large population.

105. (3) A-ii, B-iii, C-iv, D-i
Various national missions are implemented by specialized government departments. The BioE3 Policy is led by the Department of Biotechnology, while the Department of Science and Technology oversees the National Quantum Mission. The Ministry of New and Renewable Energy is the nodal agency for the Green Hydrogen Mission, and the Ministry of Electronics and Information Technology manages the India Semiconductor Mission.

106. (1) Biomanufacturing Hubs and Biofoundries
To bridge the gap between initial research and large-scale commercial production, the BioE3 Policy proposes the creation of Biomanufacturing Hubs and Biofoundries. These facilities will provide the necessary infrastructure and expertise for startups and industries to scale up their biotechnological innovations. By centralizing high-end equipment and technical support, these hubs will accelerate the development and market entry of bio-based products.

107. (4) Deep-sea mineral mining
The strategic themes of the BioE3 Policy include climate-resilient agriculture, high-value bio-based chemicals, and smart proteins. Deep-sea mineral mining is not a part of this policy, as it falls under different ocean exploration initiatives. The BioE3 Policy focuses specifically on utilizing biological systems and biotechnology to solve economic and environmental challenges through sustainable biomanufacturing and circular economy principles.

108. (2) To use AI to optimize research and biomanufacturing processes
Bio-AI hubs are established under the BioE3 Policy to integrate artificial intelligence with biotechnological research. The fundamental rationale is to use AI and machine learning to analyze complex biological data and optimize manufacturing processes. This integration can lead to faster discovery of new bio-products, improved efficiency in production, and more precise control over biological systems, ultimately driving innovation in the bioeconomy.

109. (3) iStart Rajasthan
iStart Rajasthan is the flagship initiative of the Government of Rajasthan designed to nurture innovation and support the startup ecosystem in the state. Launched by the Department of Information Technology and Communication, it provides a comprehensive platform for entrepreneurs to register their startups and access various benefits. The program aims to create jobs and foster a culture of entrepreneurship across Rajasthan.

110. (4) I, II, III, IV, and V
The iStart Rajasthan program comprises several integrated components to support startups. These include the Bhamashah Techno Hub for incubation, the QRate framework for assessment, and iStart Nest incubators across various districts. Additionally, the Challenge for Change initiative invites startups to solve government problems, while Rural iStart focuses on fostering innovation in smaller towns and villages, ensuring inclusive growth throughout the state.

111. (1) Providing an assessment framework for startups to gauge readiness
The QRate mechanism is a specialized assessment framework under the iStart Rajasthan program. It evaluates startups on various parameters to determine their business readiness and potential. By providing a clear scorecard, QRate helps entrepreneurs identify their strengths and areas for improvement. This standardized rating also helps investors and the government identify high-potential startups for funding and further institutional support.

112. (2) Jaipur
The Bhamashah Techno Hub is located in Jaipur and stands as one of the largest and most advanced startup incubators in India. It offers state-of-the-art facilities, including coworking spaces, meeting rooms, and specialized labs for budding entrepreneurs. By providing a centralized location for innovation, the hub fosters collaboration and provides startups with the resources they need to scale their operations.

NODIA

financial incentives to domestic companies and startups involved in integrated circuit and system-on-chip design. By offering access to software tools and infrastructure, the scheme aims to nurture local talent and encourage the development of indigenous intellectual property in semiconductors.

97. (1) Traditional internal combustion engine assembly lines
The India Semiconductor Mission focuses specifically on high-tech domains like silicon CMOS fabs, display fabs, and compound semiconductors. It does not provide fiscal support for traditional industrial activities like internal combustion engine assembly lines. The mission's incentives are strictly targeted toward building the advanced technological infrastructure required for a modern semiconductor industry and reducing India's heavy reliance on electronic imports.

98. (3) Statement I is true but Statement II is false
Compound semiconductors are indeed essential for modern applications like 5G and electric vehicles due to their high efficiency. Contrary to the second statement, the India Semiconductor Mission provides significant incentives for setting up compound semiconductor facilities. The government recognizes the strategic importance of these materials and offers fiscal support to ensure that India develops a strong manufacturing base in this advanced technological field.

99. (3) Economy, Environment, and Employment
The BioE3 Policy, approved in 2024, stands for Biotechnology for Economy, Environment, and Employment. This policy reflects the government's commitment to leveraging biological sciences to drive sustainable economic growth. By focusing on these three pillars, the policy aims to protect the environment and create new job opportunities while transitioning toward a bio-based economy that utilizes renewable resources for various industrial applications.

100. (4) I, II, III, and IV
The BioE3 Policy is a comprehensive initiative piloted by the Department of Biotechnology. It aims to promote high-performance biomanufacturing and accelerate the transition toward a circular bioeconomy in India. A key feature of the policy is the establishment of Bio-AI hubs, which will integrate biotechnology with artificial intelligence to optimize research and production processes, fostering innovation across multiple biological sectors.

101. (3) Sustainable use of renewable biological resources to minimize waste
A circular bioeconomy involves the sustainable use of renewable biological resources to produce food, materials, and energy. The core principle is to minimize waste by keeping resources in use for as long as possible and recycling biological materials back into the production cycle. This approach reduces the reliance on fossil-based products and helps mitigate the environmental impact of industrial manufacturing processes.

102. (2) Climate change and resource depletion
The BioE3 policy is specifically designed to address global challenges such as climate change and the depletion of natural resources. By promoting biomanufacturing and bio-based products, the policy seeks to provide sustainable alternatives to traditional chemical processes that contribute to environmental degradation. This shift is essential for achieving long-term ecological balance and ensuring the sustainable availability of resources for future generations.

103. (4) Chemical-based to bio-based processes
One of the fundamental shifts proposed by the BioE3 policy is moving the manufacturing paradigm from traditional chemical-based processes to modern bio-based ones. This transition utilizes biological systems like microorganisms and enzymes to produce chemicals, materials, and fuels. Bio-based manufacturing is generally more sustainable and environmentally friendly, as it often requires less energy and generates fewer harmful by-products compared to conventional chemical industries.

104. (1) Functional foods and smart proteins - Addressing nutritional security and sustainable dietary alternatives
The BioE3 policy identifies functional foods and smart proteins as a key thematic sector. This focus aims to address national nutritional security by developing sustainable dietary alternatives using biotechnology. These innovations can provide high-quality protein sources with a lower

Click Here to Buy book on Amazon

decentralized model ensures that government services are accessible to everyone, regardless of their location, significantly enhancing the convenience and transparency of governance.

122. (1) Rajasthan Sampark
Rajasthan Sampark is the centralized portal for public grievance redressal in the state. It allows citizens to register complaints against various government departments online or through a dedicated helpline. The system tracks each grievance until it is resolved, ensuring accountability and transparency in the administration. This initiative empowers citizens by providing a formal and efficient channel to voice their concerns and seek solutions.

123. (4) It provides a unique digital identity for accessing multiple apps
The Rajasthan Single Sign-On identity provides citizens and government employees with a unique digital credential to access various state applications. Instead of managing multiple usernames and passwords, users can log into a wide range of services, including e-Mitra and Rajasthan Sampark, using a single ID. This initiative streamlines digital interactions and improves the security and efficiency of the state's online service ecosystem.

124. (2) Rajasthan has completely banned the use of cloud computing for state data.
Rajasthan has not banned cloud computing; in fact, the state uses a State Data Centre and specialized cloud infrastructure to securely host government applications. This infrastructure is essential for the reliable delivery of digital services. Other key features include the RajNET connectivity network and e-Mitra Plus kiosks, which function like automated teller machines to provide various services directly to citizens.

125. (3) A-iii, B-iv, C-i, D-ii
Rajasthan has developed various digital platforms for different needs. e-Mitra serves as the primary network for citizen service delivery. Rajasthan Sampark is dedicated to public grievance redressal, while RajKaj provides an integrated workflow for government employees. Additionally, Raj eVault offers a secure digital space for citizens to store and manage their important documents and certificates, reducing the need for physical paperwork.

126. (3) 30 GW
The Rajasthan Solar Energy Policy of 2019 set an ambitious target to achieve a total solar power capacity of thirty gigawatts by the year 2024-25. This goal reflects the state's commitment to becoming a leader in renewable energy and utilizing its vast solar potential. By significantly increasing solar generation, Rajasthan aims to meet its energy needs sustainably and contribute to national renewable energy targets.

127. (4) 24 GW
Within the overall thirty gigawatt target, the Rajasthan Solar Energy Policy specifically allocates twenty-four gigawatts for utility and grid-scale solar parks. These large-scale projects are essential for generating massive amounts of clean energy that can be fed into the state and national power grids. The focus on large parks leverages Rajasthan's extensive wasteland and high solar insolation to drive industrial-scale renewable energy production.

NODIA

128. (2) Electricity Duty exemption for a period of 10 years
To promote investment in the renewable energy sector, the Rajasthan Solar Energy Policy provides an exemption from electricity duty for a period of ten years. This incentive reduces the operational costs for solar power producers, making their projects more financially viable. Such policy support is crucial for attracting private developers and ensuring the steady growth of solar energy infrastructure throughout the state.

129. (1) Rajasthan Renewable Energy Corporation Limited (RRECL)
The Rajasthan Renewable Energy Corporation Limited serves as the nodal agency for the registration and facilitation of all renewable energy projects in the state. It plays a central role in implementing the solar and wind energy policies, coordinating with developers, and ensuring that projects are completed efficiently. RRECL acts as a single point of contact for investors, simplifying the administrative processes for green energy projects.

113. (1) Recognized startups can receive a sustenance allowance for one year
Under the iStart Rajasthan initiative, recognized startups are eligible for a monthly sustenance allowance for up to one year. This financial assistance is intended to help entrepreneurs manage their initial operational costs and focus on developing their products. The program also offers other forms of funding, such as marketing assistance and seed grants, based on the startup's stage and performance.

114. (3) By providing additional financial incentives or allowance top-ups
iStart Rajasthan specifically encourages inclusive entrepreneurship by providing extra support to women-led startups and those from marginalized sections. This support often comes in the form of higher financial incentives or top-ups on the standard sustenance allowance. By addressing the unique challenges faced by these groups, the state government aims to create a more equitable and diverse startup ecosystem in Rajasthan.

115. (4) Challenge for Change
The Challenge for Change is a unique initiative where the Rajasthan government invites startups to provide innovative solutions for various administrative and departmental challenges. Successful startups can partner with the government to implement their solutions, providing them with a valuable opportunity to test their products at scale. This initiative promotes efficiency in governance while supporting the growth of the local startup community.

116. (4) Guaranteed permanent government jobs for all founders
iStart Nest incubators provide essential support like plug-and-play office space, professional mentorship, and access to networking events. They are designed to help startups grow into independent, successful businesses rather than providing government employment. The focus is on creating a self-sustaining entrepreneurial ecosystem where founders can build their own companies and contribute to the private sector economy of the state.

117. (3) Statement I is true but Statement II is false
The iStart Rajasthan platform is designed to be a fully digital, single-window system for startup registration and benefit access. Entrepreneurs do not need to physically visit multiple government offices, as the entire recognition process is handled online through the integrated portal. This digital-first approach significantly improves the ease of doing business and makes the government more accessible to modern tech startups.

118. (2) RajNET
RajNET is Rajasthan's state-wide integrated network that provides high-speed connectivity down to the Gram Panchayat level. It utilizes various technologies, including VSAT and optical fiber, to ensure that digital services can be delivered to even the most remote parts of the state. This robust infrastructure is the backbone of the state's e-governance initiatives, enabling efficient communication and service delivery.

NODIA

119. (4) To make Rajasthan a preferred destination for IT investments
The overarching vision of the Rajasthan IT/ITeS Policy is to transform the state into a leading destination for information technology investments. By providing various incentives and developing a strong digital infrastructure, the policy aims to attract global and domestic IT companies. This strategy is intended to create high-quality jobs, boost the local economy, and integrate Rajasthan more deeply into the global digital market.

120. (1) Both A and R are true and R is the correct explanation of A.
The Rajasthan IT Policy offers several strategic incentives, such as concessional land allotment and electricity duty exemptions, to attract IT companies. These measures are designed to reduce the initial capital and recurring operational costs for businesses. By making the state more competitive, the government aims to encourage industrial growth, create employment, and strengthen the overall digital economy in Rajasthan.

121. (3) e-Mitra
e-Mitra is a flagship e-governance initiative of the Rajasthan government that provides hundreds of government-to-citizen and business-to-citizen services. Through a vast network of kiosks across the state, citizens can pay bills, apply for certificates, and access welfare schemes. This

an inclusive digital ecosystem that enhances transparency and efficiency.

53. (3) Broadband Highways
One of the nine pillars of growth under the Digital India Mission is the development of Broadband Highways. This pillar focuses on providing high-speed internet connectivity across the entire country, including rural areas. By building a robust digital network, the government aims to enable the seamless delivery of various electronic services and foster economic development through improved information access.

54. (2) It is the world's largest rural broadband connectivity programme using Optical Fibre.
The BharatNet project is a critical component of the Digital India Mission, aiming to connect all gram panchayats in the country with high-speed broadband. It is recognized as the world's largest rural connectivity program using optical fiber. By providing internet access to rural communities, BharatNet facilitates e-governance, e-health, and e-education, thereby promoting inclusive growth and digital literacy.

55. (4) To provide a single platform for accessing government services
The UMANG app was developed as part of the Digital India initiative to offer citizens a unified platform for accessing hundreds of central and state government services. Through a single mobile application, users can pay utility bills, access healthcare services, and manage their documents. This initiative significantly improves the ease of interacting with the government and enhances the efficiency of service delivery.

56. (1) Massive increase in digital peer-to-peer transactions via UPI
The Digital India initiative has revolutionized the financial sector by promoting the adoption of the Unified Payments Interface. This has led to a massive increase in digital peer-to-peer and merchant transactions across the country. UPI has made digital payments simple and accessible for millions of people, significantly contributing to the formalization of the economy and reducing the reliance on cash.

57. (3) MeghRaj
MeghRaj is the government's cloud computing initiative launched under the Digital India program to optimize the use of ICT infrastructure. It provides a platform for hosting various government applications and data, ensuring better utilization of resources and faster delivery of services. By centralizing cloud services, the government can achieve higher efficiency, security, and scalability for its numerous digital initiatives.

58. (1) Centralizing all state powers to the federal tech department
The Digital India Mission aims to empower citizens and improve governance rather than centralizing all state powers. Its targeted impacts include reducing paperwork through platforms like DigiLocker and promoting electronic manufacturing within the country. The mission focuses on enhancing transparency and accountability in government processes, ensuring that services are delivered efficiently and directly to the people through digital channels.

59. (4) Public Internet Access Programme
Common Services Centres serve as local access points for the delivery of essential public utility services and social welfare schemes. They primarily fall under the Public Internet Access Programme pillar of Digital India. These centers are crucial for providing digital services to citizens in rural and remote areas where internet connectivity and digital literacy might otherwise be limited.

60. (4) I, II, III, and IV
The Digital India Mission is structured around nine pillars, including e-Governance and e-Kranti, which focus on reforming government processes and delivering services electronically. Other key pillars include Information for All, which ensures transparency, and Electronics Manufacturing, which aims to achieve net zero imports. Together, these pillars provide a comprehensive framework for building a digitally advanced and self-reliant nation.

61. (3) National Research Foundation
The National Education Policy 2020 proposes the establishment of the National Research Foundation as an apex body to strengthen

Downloaded from www.pdf.tube

130. (4) I, II, and III
The thirty gigawatt target in the Rajasthan Solar Energy Policy is broken down into specific categories. This includes twenty-four gigawatts for large utility-scale parks, four gigawatts for distributed solar projects, and one gigawatt for solar rooftop systems. Together with an additional target for solarizing agricultural pumps, these components provide a comprehensive plan to diversify solar energy generation across different scales and consumer types.

131. (3) Solarization of agriculture pumps (under PM-KUSUM)
The Rajasthan Solar Energy Policy specifically addresses the needs of agricultural consumers through the solarization of water pumps. This initiative, often linked with the national PM-KUSUM scheme, allows farmers to use solar energy for irrigation. By providing reliable daytime power, it reduces their dependence on the traditional grid and diesel pumps, ultimately lowering costs and promoting sustainable farming practices in rural areas.

132. (4) 100% exemption on stamp duty is provided.
To reduce the initial capital expenditure for renewable energy developers, the Rajasthan government provides a one hundred percent exemption on stamp duty for land allotment or purchase. This measure is intended to lower the financial barriers to setting up solar power projects. By providing such significant fiscal relief, the state aims to accelerate the deployment of solar infrastructure and maintain its competitive advantage in the sector.

133. (3) The western desert districts (Thar desert region)
The western desert districts of Rajasthan, including Jodhpur, Jaisalmer, and Bikaner, are the primary focus for developing large-scale solar parks. This region offers exceptionally high solar radiation and vast tracts of available wasteland, making it ideal for solar energy production. These geographic advantages have allowed Rajasthan to host some of the world's largest solar parks, contributing significantly to the state's renewable energy capacity.

134. (2) Solar Water Pumps - Target of 1 GW
The Rajasthan Solar Energy Policy of 2019 defines specific capacity targets for various segments to reach its total goal. One of these targets includes one gigawatt specifically for solar water pumps to support the agricultural sector. Other components like rooftop solar and distributed projects have their own respective targets, ensuring a balanced approach to solar energy development that benefits different stakeholders across the state.

135. (4) Local industries adopting solar power to reduce costs
By providing full exemptions on transmission and wheeling charges for captive solar use, the Rajasthan government makes it much cheaper for local industries to generate and use their own solar power. This policy incentive encourages factories and commercial units to invest in solar installations to lower their overall electricity bills. Such measures not only benefit the industries financially but also promote the adoption of clean energy.

NODIA

136. (2) 1983
The Department of Science and Technology in Rajasthan was established in 1983 to promote scientific research and technological development within the state. Since its formation, it has worked to create a favorable environment for scientists and innovators. The department is responsible for coordinating various scientific programs and ensuring that technology is used effectively to address the developmental needs of the state's population.

137. (3) To advise the state government on development through S&T
The primary role of the Rajasthan State Council for Science and Technology is to provide expert advice to the state government on development issues related to science and technology. The council helps formulate policies that leverage scientific advancements to improve sectors like agriculture, industry, and environment. It acts as a bridge between the scientific community and policymakers to ensure evidence-based decision-making.

138. (1) Jodhpur
The State Remote Sensing Application Centre is located in Jodhpur and serves as a key institution

enables ultra-secure communication. By using the principles of quantum physics, QKD allows two parties to share encryption keys in a way that any attempt at interception is immediately detected. This technology is vital for protecting highly sensitive information in government, defense, and financial sectors from the growing threat of cyber-attacks.

188. (2) Attracting global packaging firms to establish plants
By offering significant fiscal support for ATMP and OSAT facilities, the India Semiconductor Mission aims to attract global companies involved in semiconductor packaging and testing. These facilities are a critical part of the supply chain, turning fabricated wafers into finished chips. Establishing a strong packaging industry in India will create a more complete semiconductor ecosystem, attract further high-tech investments, and generate numerous skilled jobs.

189. (4) Nuclear Waste Management
The BioE3 Policy is centered on biotechnological themes like biomanufacturing, precision biotherapeutics, and smart proteins. Nuclear waste management is a specialized area of atomic energy research and is not a strategic theme of this biotechnology policy. The BioE3 framework focuses specifically on leveraging biological systems to create sustainable industrial products and address challenges in agriculture, health, and the environment through a circular bioeconomy.

190. (1) I, II, III, and IV only
Several national and state policies have clearly defined targets and timeframes. These include Rajasthan's thirty gigawatt solar target by 2024-25 and the National Green Hydrogen Mission's five million metric tonne goal by 2030. The National Quantum Mission is scheduled for 2023-2031, and NEP 2020 targets a fifty percent GER by 2035. However, Digital India was launched in 2015, not 2010.

191. (1) DST (Govt of India) / TIFAC
The Patent Information Centre in Rajasthan is typically supported through the national framework provided by the central Department of Science and Technology and TIFAC. This collaboration ensures that state-level IPR initiatives are aligned with national standards and receive the necessary technical guidance. The centre plays a vital role in helping local innovators protect their intellectual property and navigate the complex patenting landscape.

192. (2) JIGYASA
JIGYASA is a unique program that connects school students with scientists from various national laboratories across India. The initiative aims to foster a culture of scientific inquiry by providing students with hands-on experience in research environments. By interacting directly with scientists, students can develop a better understanding of scientific principles and be inspired to pursue future careers in research and development.

193. (1) Ministry of AYUSH
The Traditional Knowledge Digital Library is a joint venture between the Council of Scientific and Industrial Research and the Ministry of AYUSH. By documenting traditional Indian medicinal knowledge, the TKDL prevents international patent offices from granting wrong patents on traditional formulations. This initiative is crucial for protecting India's cultural heritage and ensuring that its traditional knowledge remains in the public domain for future generations.

194. (3) It is known for sequencing the first Indian human genome.
The Council of Scientific and Industrial Research achieved a major milestone by sequencing the first Indian human genome. This achievement highlights CSIR's capability in advanced genomic research. Established in 1942, before independence, CSIR focuses on industrial research across many sectors. Its leadership includes the Prime Minister as President, and it is recognized for its significant contributions to India's scientific and technological landscape.

195. (4) National Innovation Foundation (NIF)
A student team from a rural area that develops an innovative technological solution should seek help from the National Innovation Foundation. The NIF is specifically dedicated to supporting grassroots innovations and traditional knowledge. It provides the necessary resources for testing, validating, and protecting new ideas through patents, ensuring that the creative potential of

Click Here to Buy book on Amazon

of stakeholders across various levels. This inclusive process was designed to ensure that the policy addresses the diverse needs of the scientific community and the general population more effectively than traditional methods.

147. (4) Atal Innovation Mission (via AICs)
A researcher seeking incubation support and technical mentorship for a deep-tech startup would primarily look to the Atal Innovation Mission. Through its network of Atal Incubation Centres, the mission provides startups with the necessary infrastructure and expert guidance to develop their innovations. These centers are specifically designed to nurture early-stage companies and help them navigate the complexities of bringing science-based products to market.

148. (3) Automatic FDI up to 74% and 100% with government approval
The Make in India policy for the defense sector allows for seventy-four percent Foreign Direct Investment through the automatic route. For investments beyond this limit, companies must seek specific government approval. This policy is designed to attract global defense manufacturers to set up production facilities in India while maintaining strategic oversight. It aims to boost domestic production and facilitate the transfer of advanced military technologies.

149. (2) It is a purely academic degree-granting university with no industrial tie-ups.
The Council of Scientific and Industrial Research is primarily a research and development organization with a strong focus on industrial applications, rather than a traditional degree-granting university. It operates thirty-seven national laboratories and is known for its extensive collaboration with various industries. While it supports academic research, its core mission is to develop technologies that solve industrial problems and contribute to national development.

150. (1) I, II, III, and IV only
The National Green Hydrogen Mission and the BioE3 Policy both aim to reduce fossil fuel imports and promote a sustainable, low-carbon economy. Green hydrogen is produced through renewable energy electrolysis, while BioE3 focuses on biomanufacturing. These policies are implemented by the Ministry of New and Renewable Energy and the Department of Biotechnology, respectively, rather than the Ministry of Electronics and Information Technology.

151. (4) National Research Foundation
The National Research Foundation is the key mechanism established under the NEP 2020 to promote research in academic institutions. Its primary function is to provide funding and create a supportive environment for researchers across various fields. By bridging the gap between academia and industry, the foundation aims to build a robust research culture that can drive national innovation and solve complex societal challenges.

152. (1) Exemption from prior experience and turnover criteria
To support new businesses, the Startup India initiative provides recognized startups with an exemption from the requirements of prior experience and turnover in public procurement. This policy allows startups to participate in government tenders on an equal footing with established companies. By lowering these entry barriers, the government provides startups with a vital opportunity to secure large contracts and demonstrate their capabilities.

153. (3) Startup India Seed Fund Scheme (SISFS)
The Startup India Seed Fund Scheme is specifically designed to provide early-stage funding to startups, including those developing hardware technologies. This financial support helps entrepreneurs cover the costs of building prototypes and conducting initial product trials. By addressing the funding gap at the very beginning of the startup journey, the scheme enables innovators to transform their ideas into viable products and attract further investment.

154. (1) A repository of grassroots innovations and traditional knowledge
The National Innovation Portal is a comprehensive database developed by the National Innovation Foundation to showcase grassroots innovations and traditional knowledge. It serves as a repository of thousands of unique solutions developed by common people from across the

NODIA

171. (4) Fostering grassroots innovation in rural districts
The Rural iStart program is a specialized initiative of the Rajasthan government aimed at promoting innovation in rural areas. It focuses on identifying and supporting grassroots innovators in villages and smaller towns who may not have access to urban incubation facilities. By providing them with mentorship and funding, the program ensures that the benefits of the state's startup ecosystem reach every part of the country.

172. (2) Inviting startups to solve state administrative challenges
Rajasthan's 'Challenge for Change' is a strategic initiative that invites startups to partner with the government to solve specific administrative and developmental problems. Startups can pitch their innovative ideas to various departments, and successful solutions may be implemented at a state-wide level. This program provides startups with a major client while helping the government improve its efficiency and service delivery through modern technological interventions.

173. (3) Raj-Kaushal
Raj-Kaushal is an integrated state-level portal developed by the Rajasthan IT department to match job seekers with employers. It serves as a comprehensive platform for managing labor demand and supply within the state. By connecting skilled individuals with relevant job opportunities, the portal aims to reduce unemployment and help industries find the right talent, contributing to the overall economic development of Rajasthan.

174. (4) Developing a 30,000 MW capacity by the year 2024-25
A core objective of the Rajasthan Solar Energy Policy 2019 is to develop a solar power capacity of thirty thousand megawatts by the year 2024-25. The policy includes several measures to reach this goal, such as promoting rooftop solar, large-scale parks, and the solarization of agricultural pumps. It provides various exemptions and incentives to attract the necessary investments to transform Rajasthan into a renewable energy powerhouse.

175. (1) Reducing capital expenditure to attract investments
The Rajasthan government offers a full exemption on stamp duty for solar project land to reduce the initial capital expenditure for developers. This fiscal incentive makes the state more attractive to investors by lowering the upfront costs of setting up large-scale solar parks. Such measures are part of a broader strategy to leverage the state's geographic advantages and achieve ambitious targets for renewable energy generation.

176. (2) Rajasthan Renewable Energy Corporation Limited (RRECL)
Rajasthan Renewable Energy Corporation Limited is the state-owned enterprise that acts as the nodal agency for all renewable energy initiatives. It is responsible for implementing policies related to solar, wind, and biomass energy. RRECL facilitates the development of green energy projects by coordinating land allotment, grid connectivity, and other administrative requirements, ensuring that the state remains a leader in the renewable energy sector.

177. (1) Bhamashah Techno Hub
A startup founder in Jaipur seeking mentorship and incubation should apply to the Bhamashah Techno Hub. This world-class facility provides comprehensive support, including coworking spaces, technical labs, and access to investors. It serves as the heart of Rajasthan's startup ecosystem, offering the resources and networking opportunities needed for entrepreneurs to transform their innovative ideas into successful and scalable business ventures.

178. (3) It automatically grants a 1 crore rupee loan to any startup that applies.
The QRate program is an assessment and scorecard mechanism designed to help startups evaluate their business readiness. It does not automatically grant large loans to any applicant. Instead, the rating helps startups understand their strengths and weaknesses, making them better prepared to seek funding from investors or apply for specific government grants. The program focuses on capacity building and structured evaluation rather than unconditional financial handouts.

Downloaded from www.pdf.tube

prosperous future for the country through scientific innovation.

163. (3) Public Wi-Fi Networks
The PM-WANI scheme is a Digital India initiative designed to expand internet access through a vast network of public Wi-Fi hotspots. It allows small shopkeepers and local providers to offer Wi-Fi services to the public, creating a decentralized and affordable way for citizens to stay connected. By increasing the availability of public Wi-Fi, the scheme aims to promote digital inclusion and support the growing knowledge economy.

164. (4) It explicitly bans all forms of foreign direct investment in India.
The Atmanirbhar Bharat Abhiyan does not ban foreign direct investment; on the contrary, it includes several reforms to attract more FDI, especially in sectors like defense. The campaign focuses on making India self-reliant by strengthening domestic industries and simplifying regulations. It aims to build a strong internal economy that is globally integrated and resilient to external shocks, rather than adopting a policy of economic isolation.

165. (3) A-ii, B-iii, C-i, D-iv
India's innovation ecosystem is supported by various institutions with distinct focus areas. The Science and Engineering Research Board funds basic scientific research, while the National Innovation Foundation supports grassroots technological innovations. CDAC is the premier organization for supercomputing and advanced IT, and the Atal Innovation Mission is dedicated to creating a vibrant ecosystem for innovation and entrepreneurship throughout the entire country.

166. (2) Implementing PLI schemes across various key sectors
A primary strategy of the Make in India initiative to boost domestic manufacturing is the implementation of Production Linked Incentive schemes. These schemes provide financial rewards to manufacturers based on their incremental production in critical sectors like electronics and pharmaceuticals. By making it more profitable to manufacture in India, the government aims to attract global supply chains and enhance the competitiveness of Indian industries.

NODIA

167. (4) Accurate atomic clocks for precise navigation
Quantum sensing is a key focus of the National Quantum Mission, with practical applications in the development of highly accurate atomic clocks. These quantum-based clocks are essential for precise navigation systems, as they provide timing accuracy far beyond that of traditional technologies. Such sensors are critical for the next generation of satellite-based positioning and other strategic applications requiring extreme measurement precision and stability.

168. (2) Both Statement I and Statement II are false
The Atal Tinkering Labs are set up in schools to foster curiosity and innovation among young students, not in higher education institutions. Conversely, Atal Incubation Centres are established in universities and research institutes to support startups, rather than in schools. Both statements incorrectly swap the target demographic of these two key components of the Atal Innovation Mission's overall structural framework.

169. (3) Deep space satellite propulsion
The National Green Hydrogen Mission focuses on themes like electrolyser manufacturing, decarbonizing heavy industries, and expanding renewable energy capacity. While green hydrogen can be used as fuel, deep space satellite propulsion is not a primary theme of this mission. The mission's main goal is to promote green hydrogen as a clean energy carrier for industrial, transport, and energy storage applications on Earth.

170. (1) I and II only
The iStart Rajasthan policy provides recognized startups with a monthly sustenance allowance and marketing assistance to help them grow. These benefits are designed to support early-stage entrepreneurs in managing their costs and reaching new customers. However, the policy does not grant a completely tax-free status for fifteen years. The focus remains on providing direct financial and institutional support through various stages of the startup lifecycle.

CHAPTER 10

Recent Advances, Indian Contributors & Indigenization

1. In 1930, Sir C.V. Raman was awarded the Nobel Prize in Physics for his work on which of the following phenomena?
(1) Photoelectric effect
(2) Scattering of light
(3) Thermionic emission
(4) Electromagnetic induction
(5) Question not attempted

2. The Raman Effect demonstrates which specific type of scattering when monochromatic light passes through a transparent medium?
(1) Inelastic scattering where scattered light shifts in frequency
(2) Elastic scattering where photons maintain the same incident frequency
(3) Coherent scattering where waves align in a perfectly synchronized phase
(4) Rayleigh scattering where the wavelength remains completely unaltered
(5) Question not attempted

3. National Science Day is celebrated in India on February 28 every year to commemorate which of the following events?
(1) The birth anniversary of Sir C.V. Raman
(2) The day C.V. Raman received the Nobel Prize
(3) The discovery of the Raman Effect
(4) The establishment of the Indian Institute of Science
(5) Question not attempted

4. Consider the following statements regarding the Raman Effect:
Statement I: The lines in the scattered spectrum with lower frequencies than the incident light are called Stokes lines.
Statement II: The lines with higher frequencies than the incident light are called anti-Stokes lines.
Which of the following is correct?
(1) Both Statement I and Statement II are correct
(2) Both Statement I and Statement II are incorrect
(3) Statement I is correct but Statement II is incorrect
(4) Statement I is incorrect but Statement II is correct
(5) Question not attempted

5. Match the following Indian scientists in List I with their key contributions in List II and select the correct answer using the given options.
List I: (Indian Scientist)
A. C.V. Raman
B. Srinivasa Ramanujan
C. Homi J. Bhabha
D. Meghnad Saha
List II: (Key Contribution)
i. Ionization equation
ii. Cosmic ray cascade theory
iii. Inelastic scattering of light
iv. Mock theta functions
(1) A-i, B-ii, C-iii, D-iv
(2) A-iii, B-i, C-ii, D-iv
(3) A-iii, B-iv, C-ii, D-i
(4) A-ii, B-iii, C-iv, D-i
(5) Question not attempted

6. Which of the following statements about C.V. Raman is incorrect?
(1) He was the first Asian to receive a Nobel Prize in any branch of science.
(2) He served as the first Chairman of the Indian Space Research Organisation.
(3) He established the Raman Research Institute in Bangalore.
(4) He was awarded the Bharat Ratna in 1954.
(5) Question not attempted

Click Here to Buy book on Amazon

179. (1) Both Statement I and Statement II are true
The Rajasthan Department of Science and Technology operates the State Remote Sensing Application Centre, which plays a crucial role in the state's development. By using satellite data, the center provides GIS-based information for urban planning, disaster management, and agriculture. This technological support is essential for effective resource management and helps various departments make informed decisions based on accurate spatial data and environmental analysis.

180. (4) I, II, III, and IV
Rajasthan has implemented several digital initiatives, including e-Mitra for service delivery, RajKaj for government workflow, and Rajasthan Sampark for grievance redressal. The Single Sign-On system provides a unified identity for accessing these services. Together, these programs are designed to improve governance transparency, enhance the efficiency of citizen service delivery, and make the government more accessible to people through modern technology.

181. (3) Allowing private sector participation in space services
The space sector reforms under Atmanirbhar Bharat focused on opening up the industry to private players. By allowing private sector participation in satellite manufacturing and space services, the government aims to boost innovation and competitiveness. This shift is intended to make India a global hub for space technology and services, leveraging the capabilities of both ISRO and new entrepreneurial ventures in the private sector.

182. (2) Through the IGNITE awards
The National Innovation Foundation recognizes and encourages student innovators through the annual IGNITE awards. This national competition invites school children to submit their original technological ideas and innovations. By providing recognition and support to young minds, the foundation aims to foster a culture of creativity and problem-solving from an early age, ensuring that the next generation contributes to national scientific growth.

183. (4) STP 2003 - Atal Bihari Vajpayee
The Science and Technology Policy of 2003 was issued during the tenure of Prime Minister Atal Bihari Vajpayee. It focused on addressing the challenges of the twenty-first century by emphasizing the integration of science and technology with the economy. Other historical policies like SPR 1958 were issued under Jawaharlal Nehru, and STIP 2013 was launched during the leadership of Manmohan Singh.

184. (1) Promoting women in science and gender parity in R&D
The KIRAN scheme is a dedicated initiative by the Department of Science and Technology to support women in the scientific field. It addresses the various challenges faced by women scientists throughout their careers, providing them with opportunities for research and leadership. The scheme aims to achieve gender parity in research and development, ensuring that women play an equal role in India's scientific progress.

185. (3) A-ii, B-i, C-iv, D-iii
India's innovation framework has several key elements with unique characteristics. Atal Tinkering Labs provide workspaces for school-level innovation. The Startup India Seed Fund offers critical proof of concept funding for new businesses. The Make in India PLI scheme provides incentives for domestic manufacturing, and the BioE3 Policy focuses on promoting high-performance biomanufacturing to drive sustainable economic and environmental growth.

186. (1) Mandatory Cryptocurrencies
Mandatory cryptocurrencies are not a pillar of the Digital India Mission. The mission is built on nine foundational pillars, including Universal Access to Mobile Connectivity, Broadband Highways, and e-Kranti. These pillars focus on developing digital infrastructure, providing electronic government services, and promoting digital literacy. The goal is to create a digitally empowered society through government-led initiatives rather than mandating the use of decentralized digital currencies.

187. (4) Ensuring ultra-secure, unhackable communication channels
Quantum Key Distribution is a central focus of the National Quantum Mission because it

Downloaded from www.pdf.tube

country. By making this information accessible, the portal helps recognize local creativity and provides a platform for connecting innovators with potential collaborators and investors.

155. (1) II, IV, III, I
An entrepreneur typically begins their journey by registering on the Startup India Portal and obtaining recognition from the DPIIT. After this, they may apply for seed funding to develop their prototype. Once the business model is proven and the startup begins to grow, they can utilize the Fund of Funds to secure larger investments for scaling their operations and expanding into new markets.

156. (2) To support the chip design ecosystem with financial aid
The Design Linked Incentive scheme under the India Semiconductor Mission is focused on strengthening the domestic chip design industry. It provides financial support to companies that develop semiconductor designs in India. By reducing the costs associated with high-end design tools and infrastructure, the scheme encourages the creation of indigenous intellectual property and helps India become a global hub for semiconductor design and innovation.

157. (3) High journal subscription costs for Indian researchers
The 'One Nation, One Subscription' initiative under STIP 2020 specifically addresses the problem of expensive journal subscriptions. Many Indian researchers and institutions struggle to afford the high fees charged by international scientific journals. By providing a centralized subscription, the government ensures that all researchers in the country have access to the latest scientific literature, thereby democratizing knowledge and promoting high-quality research across India.

158. (4) By adopting multidisciplinary and inquiry-based learning
The National Education Policy 2020 proposes a major shift in science pedagogy by moving away from rote memorization toward inquiry-based and multidisciplinary learning. This approach encourages students to ask questions, perform experiments, and see the connections between different subjects. By fostering a deeper understanding of scientific concepts and their real-world applications, the policy aims to develop critical thinking skills and a passion for science.

159. (1) DST - National Quantum Mission
The Department of Science and Technology is the implementing agency for the National Quantum Mission. Other programs like the Atal Innovation Mission are led by NITI Aayog, and the BioE3 Policy is a product of the Department of Biotechnology. Digital India is overseen by the Ministry of Electronics and Information Technology. Matching these initiatives correctly is essential for understanding the administrative structure of India's science landscape.

160. (1) Both A and R are true and R is the correct explanation of A.
The National Green Hydrogen Mission is fundamentally linked to India's renewable energy growth because green hydrogen is defined by its production process. To be considered 'green', hydrogen must be produced through the electrolysis of water powered entirely by renewable sources like solar or wind. Therefore, expanding renewable capacity is a necessary prerequisite for achieving the mission's goal of large-scale green hydrogen production.

161. (2) DigiLocker
DigiLocker is a secure cloud-based platform under the Digital India initiative that allows citizens to store and access digital versions of their official documents. It is linked to the user's Aadhaar number and provides a paperless way to share verified certificates with various agencies. This service reduces the need for physical copies, prevents document loss, and speeds up the process of accessing government and private services.

162. (1) Economy, Environment, and Employment
In the BioE3 policy, the 'E3' stands for Economy, Environment, and Employment. This reflects the government's strategy to use biotechnology to drive economic growth while ensuring environmental sustainability and creating new job opportunities. The policy focuses on high-performance biomanufacturing to produce sustainable alternatives for various industries, ultimately contributing to a greener and more

NODIA

people in rural communities is recognized and supported at a national level.

196. (3) Artisanal handloom weaving without industrial scale
The Production Linked Incentive scheme is designed to boost industrial-scale manufacturing in sectors like electronics, pharmaceuticals, and solar modules. It does not typically cover small-scale artisanal activities that do not involve significant incremental production or global competitiveness. The scheme's focus is on attracting large-scale investments and building high-capacity manufacturing units that can compete in international markets and reduce the country's reliance on imports.

197. (2) Enabling multi-mode access to digital and online education
The PM e-VIDYA program was launched as part of the Atmanirbhar Bharat package to ensure continuity in education through digital platforms. It provides multi-mode access, including online portals and television channels, to educational content for students across the country. This initiative is designed to bridge the educational divide by making high-quality learning resources available to everyone, regardless of their location or internet connectivity.

198. (1) Both Statement I and Statement II are true
The BioE3 Policy emphasizes the strategic transition toward a circular bioeconomy to reduce the reliance on fossil fuels. Biomanufacturing is the core of this policy, using engineered biological systems like microbes to produce chemicals and materials sustainably. This approach is more environmentally friendly than traditional chemical processes and is essential for achieving long-term ecological balance while driving economic growth through innovation in the biotechnology sector.

199. (4) Guaranteed public election tickets for founders
Startups recognized under the iStart Rajasthan program receive various benefits, including sustenance allowances, marketing assistance, and incubation space. These measures are intended to support the business growth and innovation of new ventures. However, the program does not involve any political incentives, such as guaranteed election tickets. Its sole focus is on nurturing a robust entrepreneurial ecosystem and driving economic development through technology and innovation in the state.

200. (1) Both A and R are true and R is the correct explanation of A.
The Rajasthan Solar Energy Policy encourages decentralized solar projects like solarizing agricultural pumps because they offer significant advantages. By generating power locally, these projects reduce transmission losses that occur when electricity travels long distances through the grid. Furthermore, they provide farmers with a reliable source of power during the day, which is essential for irrigation and helps improve the overall productivity of the agricultural sector.

www.nodia.in

Click Here to Buy book on Amazon

for geospatial research in Rajasthan. It utilizes satellite data for a variety of applications, including mapping natural resources and monitoring urban growth. The center provides vital information to different government departments, helping them plan development projects and manage natural resources more effectively using modern spatial technologies.

139. (4) Setting up Science Parks and Regional Science Centres
To promote a scientific temper among the general public and students, the Rajasthan Department of Science and Technology has established several Science Parks and Regional Science Centres. These facilities offer interactive exhibits and educational programs that make science engaging and accessible. By providing hands-on learning experiences, these centers aim to spark curiosity and inspire the next generation to pursue careers in science and technology.

140. (1) I, II, and III only
The Rajasthan Department of Science and Technology directly manages institutions like the Patent Information Centre, the State Remote Sensing Application Centre, and various Science Parks across the state. These programs focus on intellectual property, geospatial technology, and science communication. While e-Mitra is a major digital initiative in the state, it is primarily managed by the Department of Information Technology and Communication, not DST.

141. (3) To facilitate patent filing and IPR awareness in the state
The Patent Information Centre was established by the Rajasthan DST to help researchers and innovators protect their intellectual property. It provides guidance on the patent filing process and conducts workshops to increase awareness about IPR. By supporting innovators in securing their rights, the center encourages creativity and ensures that local scientific discoveries can be commercially exploited while preventing unauthorized use.

142. (1) Both Statement I and Statement II are true
The Rajasthan State Science and Technology Award recognizes the outstanding work of scientists associated with the state. This initiative aims to celebrate scientific excellence and provide recognition to researchers who contribute to the development of the region. By honoring these achievements, the state government seeks to encourage more people to pursue research and help build a strong, domestic scientific community in Rajasthan.

143. (1) Providing GIS mapping for development and urban planning
The State Remote Sensing Application Centre plays a vital role in state planning by providing detailed Geographic Information System mapping. This data is used for urban planning, agriculture monitoring, and disaster management. By analyzing satellite imagery, the center can help the government make informed decisions about land use and infrastructure development, ensuring that resources are managed sustainably and development is well-coordinated.

144. (2) Regional Science Centre, Dharwad
The Science Park in Jaipur, the Science Park in Jhalawar, and the Sub-Regional Science Centre in Jodhpur are all initiatives developed within the Rajasthan state framework. However, the Regional Science Centre in Dharwad is located in Karnataka and is not part of the Rajasthan Department of Science and Technology's institutional network. Each state develops its own science centers to promote local scientific education.

145. (1) A-iv, B-i, C-ii, D-iii
India's science and innovation framework consists of various concepts linked to specific policies. The promotion of scientific temper is a foundational goal of the 1958 resolution. The 2020 policy introduces the Open Science Framework. The Atal Innovation Mission focuses on initiatives like Atal Tinkering Labs, and the Atmanirbhar Bharat campaign introduced Positive Indigenization Lists to promote self-reliance in defense production.

146. (3) STIP 2020 adopts a decentralized, bottom-up policy approach
A fundamental difference between STIP 2020 and its predecessor from 2013 is the approach to policy formulation. STIP 2020 was developed using a decentralized, bottom-up model that included extensive consultations with thousands

NODIA

7. Identify the odd one out among the practical applications of Raman spectroscopy.
(1) Determining the chemical structure of pharmaceutical drugs
(2) Identifying counterfeit artworks and historical documents
(3) Detecting explosives and narcotics at airport security
(4) Measuring the speed of moving vehicles using Doppler shift
(5) Question not attempted

8. In Raman scattering, what is the primary cause of the change in wavelength of the scattered light?
(1) Energy exchange between incident photons and molecular vibrational states
(2) Photon absorption by the medium causing localized heat dissipation effects
(3) Perfect elastic reflection of photons from the dense atomic nucleus
(4) Standard light refraction due to the varying optical density of the liquid
(5) Question not attempted

9. Which of the following is an exception to the primary areas of research conducted by C.V. Raman during his career?
(1) Acoustics of musical instruments
(2) Physiology of human vision
(3) Genetic mutation in agricultural crops
(4) Magnetic properties of crystals
(5) Question not attempted

10. Consider the following statements regarding the legacy of C.V. Raman:
I. He founded the Indian Journal of Physics.
II. He discovered the Raman Effect while working at the Indian Association for the Cultivation of Science.
III. He worked extensively on the acoustics of the tabla and mridangam.
Which of the above statement(s) is/are correct?
(1) I and II only
(2) II and III only
(3) I and III only
(4) I, II, and III
(5) Question not attempted

11. The number 1729 is famously known as the Hardy-Ramanujan number. What is the unique mathematical property of this number?
(1) The largest known prime number identified prior to the computer era
(2) The total number of mathematical theorems formally published by Ramanujan
(3) The smallest positive integer divisible by all integers ranging from 1 to 10
(4) The smallest number expressible as the sum of two cubes in two ways
(5) Question not attempted

12. Srinivasa Ramanujan made significant contributions to mathematical analysis, number theory, infinite series, and continued fractions. His work on Mock theta functions is currently finding applications in which modern scientific field?
(1) Fluid dynamics and aerodynamics
(2) Black hole thermodynamics and string theory
(3) Epidemiology and disease modeling
(4) Quantum chemistry and molecular bonding
(5) Question not attempted

13. Which of the following best defines the concept of highly composite numbers, a field extensively studied by Ramanujan?
(1) Prime numbers that have no divisors other than the number one and themselves
(2) Numbers that can be mathematically represented as the sum of consecutive primes
(3) Positive integers possessing more divisors than any smaller positive integer
(4) Specific integers whose square roots always result in a whole number value
(5) Question not attempted

14. Identify the correct pair regarding Srinivasa Ramanujan's mathematical legacy.
(1) Ramanujan Prime — A concept used strictly within classical geometry
(2) Ramanujan Theta Function — A way to calculate all right-angled triangles
(3) Ramanujan Conjecture — A theory explaining the gravitational pull of stars
(4) Ramanujan's Pi Formula — An infinite series that converges rapidly to pi
(5) Question not attempted

Downloaded from www.pdf.tube

of Liverpool.
III. He later investigated the molecular mechanisms of vision by studying the protein rhodopsin.
IV. He never became a naturalized citizen of the United States.
Which of the above statement(s) is/are correct?
(1) I, II, and III only
(2) II, III, and IV only
(3) I, III, and IV only
(4) I, II, III, and IV
(5) Question not attempted

61. Jagadish Chandra Bose is widely celebrated for inventing the Crescograph. What is the primary function of this instrument?
(1) To measure the intensity of cosmic radiation
(2) To detect minute electrical signals in the human brain
(3) To measure the extraordinarily small growth movements in plants
(4) To transmit wireless telegraphy signals across oceans
(5) Question not attempted

62. J.C. Bose was a pioneer in the generation of millimeter waves. In the electromagnetic spectrum, how do millimeter waves compare to standard microwaves?
(1) Millimeter waves have lower frequencies and longer wavelengths than standard microwaves.
(2) Millimeter waves are identical in frequency to microwaves but travel at a slower speed.
(3) Millimeter waves cannot propagate through the Earth's atmosphere, unlike microwaves.
(4) Millimeter waves have higher frequencies and shorter wavelengths than standard microwaves.
(5) Question not attempted

63. Which of the following best defines J.C. Bose's concept of plant response to stimuli?
(1) Plants possess a nervous system analogous to animals and respond via electrical signals.
(2) Plants respond to stimuli entirely through a slow chemical hormonal system.
(3) Plants lack any mechanism to respond to external stimuli like light or touch.
(4) Plants only respond to stimuli during the night due to lunar gravitational pull.
(5) Question not attempted

64. Which of the following statements correctly highlights the modern recognition of J.C. Bose's work in physics?
(1) He was posthumously awarded the Nobel Prize in Physics in 2012.
(2) The Institute of Electrical and Electronics Engineers (IEEE) recognized his 1895 demonstration of millimeter-wave communication as an IEEE Milestone.
(3) The International Astronomical Union named a galaxy after him in 2005.
(4) He is recognized as the sole inventor of the modern smartphone antenna.
(5) Question not attempted

65. Match the instrument or concept in List I with its relevance to J.C. Bose in List II and select the correct answer.
List I: (Instrument/Concept)
A. Crescograph
B. Galena detector
C. Millimeter waves
D. Plant physiology
List II: (Relevance to J.C. Bose)
i. Early semiconductor device to detect electromagnetic waves
ii. Magnifying plant tissue movement up to 10,000 times
iii. Demonstrating parallel electrical responses in living and non-living matter
iv. High-frequency radio waves around 60 GHz
(1) A-i, B-ii, C-iii, D-iv
(2) A-ii, B-i, C-iv, D-iii
(3) A-iii, B-iv, C-i, D-ii
(4) A-ii, B-iv, C-i, D-iii
(5) Question not attempted

66. Consider the following statements regarding the early history of wireless communication:
Statement I: J.C. Bose demonstrated wireless transmission of electromagnetic waves in 1895, prior to Guglielmo Marconi's famous patent.
Statement II: Bose aggressively patented his wireless inventions worldwide to secure vast commercial profits.
Which of the following is correct?
(1) Both Statement I and Statement II are correct
(2) Both Statement I and Statement II are

NODIA

(3) The emission of alpha particles from unstable isotopes
(4) The deflection of cosmic rays by the Earth's magnetic field
(5) Question not attempted

23. Which of the following best describes India's three-stage nuclear power programme formulated by Homi J. Bhabha?
(1) A plan to transition from coal, to natural gas, and then to nuclear power
(2) A military doctrine involving tactical, strategic, and thermonuclear weapons
(3) A program to build research reactors, then power reactors, and fusion plants
(4) Use of natural uranium, followed by plutonium, and eventually thorium
(5) Question not attempted

24. Which of the following statements regarding the Tata Institute of Fundamental Research (TIFR) is incorrect?
(1) It was primarily focused on agricultural research before shifting to nuclear physics.
(2) It was founded in 1945 by Homi J. Bhabha.
(3) Sir Dorabji Tata Trust provided the initial financial support for its establishment.
(4) It was initially established within the campus of the Indian Institute of Science, Bangalore.
(5) Question not attempted

25. Match the nuclear facility or institute in List I with its associated location in List II and select the correct answer.
List I: (Nuclear Facility/Institute)
A. Bhabha Atomic Research Centre (BARC)
B. Indira Gandhi Centre for Atomic Research (IGCAR)
C. Variable Energy Cyclotron Centre (VECC)
D. Atomic Minerals Directorate for Exploration (AMD)
List II: (Associated Location)
i. Hyderabad
ii. Kolkata
iii. Kalpakkam
iv. Trombay
(1) A-iii, B-iv, C-i, D-ii
(2) A-iv, B-ii, C-iii, D-i
(3) A-iv, B-iii, C-ii, D-i
(4) A-i, B-iii, C-ii, D-iv
(5) Question not attempted

26. Identify the odd one out concerning the stages of India's nuclear power programme as envisioned by Homi Bhabha.
(1) Boiling Water Reactors for desalination
(2) Pressurised Heavy Water Reactors (PHWRs)
(3) Fast Breeder Reactors (FBRs)
(4) Advanced Heavy Water Reactors (AHWRs)
(5) Question not attempted

27. Consider the following statements regarding Homi J. Bhabha's scientific contributions:
Statement I: He worked extensively on the cascade theory of cosmic ray showers with Walter Heitler.
Statement II: His research demonstrated that the cosmic ray particles interact with the atmosphere to create a shower of secondary particles.
Which of the following is correct?
(1) Both Statement I and Statement II are correct
(2) Both Statement I and Statement II are incorrect
(3) Statement I is correct but Statement II is incorrect
(4) Statement I is incorrect but Statement II is correct
(5) Question not attempted

28. What was the most appropriate reason for Homi J. Bhabha focusing the ultimate stage of India's nuclear programme on Thorium?
(1) Thorium is highly fissile and can sustain a chain reaction without any initial enrichment.
(2) India has vast reserves of monazite sands containing thorium, but limited natural uranium resources.
(3) Thorium reactors produce zero radioactive waste compared to uranium reactors.
(4) Thorium was the only nuclear fuel approved for use by the International Atomic Energy Agency at that time.
(5) Question not attempted

29. Identify the correct pair regarding Homi J. Bhabha's institutional roles.
(1) Council of Scientific and Industrial Research - First Director General

Click Here to Buy book on Amazon

B. Akash
C. Nag
D. Agni

List II: (Type/Category)
i. Surface-to-air missile
ii. Third-generation anti-tank missile
iii. Intermediate-range ballistic missile
iv. Short-range surface-to-surface ballistic missile

(1) A-i, B-ii, C-iii, D-iv
(2) A-iv, B-ii, C-i, D-iii
(3) A-iv, B-i, C-ii, D-iii
(4) A-iii, B-i, C-iv, D-ii
(5) Question not attempted

46. Consider the following statements regarding Dr. A.P.J. Abdul Kalam:
Statement I: He served as the Chief Project Coordinator for the Pokhran-II nuclear tests in 1998 along with Dr. R. Chidambaram.
Statement II: The successful nuclear tests during this period solidified his public image as the Missile Man of India.
Which of the following is correct?
(1) Both Statement I and Statement II are correct
(2) Both Statement I and Statement II are incorrect
(3) Statement I is correct but Statement II is incorrect
(4) Statement I is incorrect but Statement II is correct
(5) Question not attempted

47. Which of the following books is an exception and was NOT written or co-authored by Dr. A.P.J. Abdul Kalam?
(1) The Discovery of India
(2) Wings of Fire
(3) Ignited Minds
(4) India 2020: A Vision for the New Millennium
(5) Question not attempted

48. What was the primary effect of Dr. Kalam's leadership in the IGMDP on India's defence sector?
(1) Total reliance on imported missile systems from the Soviet Union
(2) Achieving indigenous capability in strategic and tactical missiles
(3) The privatization of all defence manufacturing facilities in India
(4) Dissolution of DRDO in favor of private sector research initiatives
(5) Question not attempted

49. Which of the following is the most appropriate description of Dr. Kalam's Technology Vision 2020?
(1) Establishing Indian colonies on the Moon and Mars by the year 2020
(2) Transforming India through science, technology, and economic growth
(3) Creating an agrarian economy independent of global industrial chains
(4) Transitioning the entire military to cyber warfare operations only
(5) Question not attempted

50. Consider the following statements regarding Dr. A.P.J. Abdul Kalam's career:
I. He started his career by designing a small hovercraft at DRDO.
II. He was the Principal Scientific Adviser to the Government of India from 1999 to 2001.
III. He served as the 11th President of India from 2002 to 2007.
Which of the above statement(s) is/are correct?
(1) I and II only
(2) II and III only
(3) I and III only
(4) I, II, and III
(5) Question not attempted

51. Har Gobind Khorana shared the 1968 Nobel Prize in Physiology or Medicine for his research detailing how:
(1) DNA replication occurs during cell division
(2) Penicillin destroys bacterial cell walls
(3) The order of nucleotides in nucleic acids dictates the synthesis of proteins
(4) Recombinant DNA technology can be used for gene cloning
(5) Question not attempted

52. Dr. Har Gobind Khorana is credited with the first successful synthesis of a functional artificial gene. This concept fundamentally demonstrated that:
(1) Genes can only function if inherited naturally from parents.
(2) Proteins can spontaneously convert into

NODIA

correct
(5) Question not attempted

37. Which of the following statements correctly describes Vikram Sarabhai's role in India's atomic energy sector?
(1) Successfully testing India's first nuclear explosive device at Pokhran
(2) Designing the first operational fast breeder reactor in the nation
(3) Assuming the AEC chairmanship after Homi J. Bhabha's death
(4) Dissolving the atomic program to allocate funds for space research
(5) Question not attempted

38. Which of the following is the most appropriate description of Vikram Sarabhai's vision for the Indian space programme?
(1) Focusing on human spaceflight and colonizing other celestial planets
(2) Applying space technology to communication and weather forecasting
(3) Using the space program as a cover for intercontinental missile development
(4) Competing in a space race to demonstrate technological superiority globally
(5) Question not attempted

39. Identify the odd one out concerning the technological focus during the early years of India's space programme under Sarabhai.
(1) Sounding rockets for upper atmospheric research
(2) Nike-Apache rockets
(3) Rohini sounding rocket series
(4) Geosynchronous Satellite Launch Vehicle (GSLV) Mk III
(5) Question not attempted

40. Read the following statements and select the correct option:
Assertion (A): Vikram Sarabhai prioritized satellite broadcasting and remote sensing in the early days of the Indian space programme.
Reason (R): He firmly believed that space technology should be utilized for education, agriculture, and national development.
(1) Both A and R are true and R is the correct explanation of A.
(2) Both A and R are true but R is not the correct explanation of A.
(3) A is true but R is false.
(4) A is false but R is true.
(5) Question not attempted

41. The Integrated Guided Missile Development Programme (IGMDP), spearheaded by Dr. A.P.J. Abdul Kalam, was formally launched by the Government of India in which year?
(1) 1974
(2) 1992
(3) 1983
(4) 1998
(5) Question not attempted

42. Dr. A.P.J. Abdul Kalam strongly advocated the concept of PURA for India's development. What does PURA stand for?
(1) Provision of Urban Amenities to Rural Areas
(2) Planning for Urban and Rural Advancement
(3) Progressive Utilization of Rural Assets
(4) Promoting Universal Rural Applications
(5) Question not attempted

43. Identify the odd one out among the missiles developed under the original Integrated Guided Missile Development Programme (IGMDP).
(1) Prithvi
(2) Agni
(3) Trishul
(4) BrahMos
(5) Question not attempted

44. Which of the following statements correctly highlights Dr. A.P.J. Abdul Kalam's contribution to ISRO before he joined DRDO?
(1) Designing the GSLV launch vehicle for heavy communication satellites
(2) Serving as Project Director for the successful SLV-3 mission
(3) Leading the Mars Orbiter Mission payload development team in India
(4) Developing cryogenic engine technology used in modern Indian rockets
(5) Question not attempted

45. Match the IGMDP missile in List I with its type/category in List II and select the correct answer.
List I: (IGMDP Missile)
A. Prithvi

NODIA

15. Select the correct chronological order of events in the life of Srinivasa Ramanujan from the given options:
A. Elected as a Fellow of the Royal Society
B. Began formal collaboration with G.H. Hardy in England
C. Published his first paper in the Journal of the Indian Mathematical Society
D. Returned to India due to declining health
(1) C, B, A, D
(2) B, C, A, D
(3) C, A, B, D
(4) B, A, C, D
(5) Question not attempted

16. Which of the following is the most appropriate description of Ramanujan's approach to mathematics?
(1) Following rigorous formal proofs and axiomatic foundations for all work
(2) Relying on intuition and insight, often omitting formal proofs
(3) Utilizing advanced mechanical calculators to deduce complex numerical patterns
(4) Translating classical Greek texts and modernizing their mathematical proofs
(5) Question not attempted

17. Consider the following statements regarding Ramanujan's work:
Statement I: He independently discovered results originally obtained by Gauss, Kummer, and others.
Statement II: His research focused entirely on applied mathematics and mechanical engineering problems.
Which of the following is correct?
(1) Both Statement I and Statement II are correct
(2) Both Statement I and Statement II are incorrect
(3) Statement I is correct but Statement II is incorrect
(4) Statement I is incorrect but Statement II is correct
(5) Question not attempted

18. Which of the following fields of mathematics is an exception and was NOT a primary focus of Srinivasa Ramanujan's research?
(1) Statistical mechanics
(2) Partition function
(3) Elliptic integrals
(4) Hypergeometric series
(5) Question not attempted

19. What was the direct effect of the collaboration between Srinivasa Ramanujan and the English mathematician G.H. Hardy?
(1) The establishment of the regional Indian Mathematical Society
(2) The introduction of abstract algebra to Indian universities
(3) The formalization and global publication of his intuitive theorems
(4) The creation of the first mechanical computing machine in India
(5) Question not attempted

20. Consider the following statements regarding Srinivasa Ramanujan:
I. He was completely self-taught in advanced mathematics.
II. He was the first Indian to be elected a Fellow of Trinity College, Cambridge.
III. National Mathematics Day in India is celebrated on his birth anniversary, December 22.
IV. He won the Fields Medal for his work on prime numbers.
Which of the above statement(s) is/are correct?
(1) I, II, and III only
(2) II, III, and IV only
(3) I, III, and IV only
(4) I, II, III, and IV
(5) Question not attempted

21. Who among the following is universally acknowledged as the father of the Indian nuclear programme?
(1) A.P.J. Abdul Kalam
(2) Vikram Sarabhai
(3) Homi J. Bhabha
(4) Raja Ramanna
(5) Question not attempted

22. The term Bhabha scattering in particle physics refers to which of the following processes?
(1) The splitting of a heavy atomic nucleus into two lighter nuclei
(2) The elastic scattering of an electron and a positron

Downloaded from www.pdf.tube

DNA sequences.
(3) Synthetic genes are immediately rejected by host bacterial cells.
(4) Chemical synthesis of biologically active DNA is possible in a laboratory.
(5) Question not attempted

53. Which of the following definitions best describes an oligonucleotide, a molecule extensively synthesized by H.G. Khorana?
(1) A complex carbohydrate used for energy storage in plants
(2) A lipid molecule forming the structural basis of cell membranes
(3) A short, single-stranded synthetic sequence of nucleic acids (DNA or RNA)
(4) A large protein complex involved in muscle contraction
(5) Question not attempted

54. Identify the correct pair regarding Har Gobind Khorana's discoveries.
(1) Start codon - UAA
(2) Nucleotide triplets code for specific amino acids
(3) Stop codon - AUG
(4) RNA polymerase - An enzyme found by him in humans
(5) Question not attempted

55. Select the correct sequence of fundamental biological processes that H.G. Khorana's research helped elucidate:
A. Translation of mRNA into an amino acid sequence
B. Transcription of DNA into mRNA
C. Folding of the polypeptide chain into a functional protein
(1) C, B, A
(2) A, B, C
(3) B, A, C
(4) B, C, A
(5) Question not attempted

56. Which of the following statements about Har Gobind Khorana's Nobel Prize is incorrect?
(1) He was awarded the Nobel Prize in Chemistry for synthesizing the first artificial protein.
(2) He shared the 1968 Nobel Prize with Robert W. Holley and Marshall W. Nirenberg.
(3) The prize was awarded for their interpretation of the genetic code and its function in protein synthesis.
(4) He confirmed that the genetic code consists of 64 distinct three-letter words (codons).
(5) Question not attempted

57. Consider the following statements:
Statement I: H.G. Khorana was the first scientist to chemically synthesize oligonucleotides.
Statement II: His techniques laid the foundational groundwork for the development of the Polymerase Chain Reaction (PCR).
Which of the following is correct?
(1) Both Statement I and Statement II are correct
(2) Both Statement I and Statement II are incorrect
(3) Statement I is correct but Statement II is incorrect
(4) Statement I is incorrect but Statement II is correct
(5) Question not attempted

58. Identify the odd one out regarding the scientific fields heavily influenced by Har Gobind Khorana's research.
(1) Plate tectonics
(2) Molecular genetics
(3) Genetic engineering
(4) Biotechnology
(5) Question not attempted

59. What was the major downstream effect of Khorana and his colleagues successfully cracking the genetic code?
(1) The immediate eradication of all viral diseases
(2) The discovery of the double-helix structure of DNA
(3) The creation of the first artificially cloned mammal
(4) Understanding mutations and developing genetic engineering
(5) Question not attempted

60. Consider the following statements about Dr. Har Gobind Khorana:
I. He was born in Raipur, a village in the Punjab province of British India.
II. He completed his Ph.D. from the University

NODIA

(2) Indian Space Research Organisation - Founding Director
(3) Atomic Energy Commission of India - First Chairman
(4) Defence Research and Development Organisation - Chief Scientific Advisor
(5) Question not attempted

30. Consider the following statements regarding Homi J. Bhabha and India's nuclear journey:
I. He presided over the first United Nations Conference on the Peaceful Uses of Atomic Energy in 1955.
II. He established the Trombay Atomic Energy Establishment.
III. He advocated for the development of nuclear weapons aggressively since 1947.
IV. He died in a tragic plane crash near Mont Blanc in 1966.
V. Apsara, Asia's first nuclear reactor, was built under his guidance.
Which of the above statement(s) is/are correct?
(1) I, II, III, and V only
(2) I, II, IV, and V only
(3) II, III, IV, and V only
(4) I, III, IV, and V only
(5) Question not attempted

31. Who is widely regarded as the father of the Indian space programme?
(1) Vikram Sarabhai
(2) Satish Dhawan
(3) U.R. Rao
(4) K. Sivan
(5) Question not attempted

32. The SITE experiment, championed by Vikram Sarabhai, was a monumental step in using technology for societal development. What does SITE stand for?
(1) Space Integration for Technology and Education
(2) Satellite Instructional Television Experiment
(3) Scientific Investigation of Terrestrial Environments
(4) Satellite Information and Telecommunication Engine
(5) Question not attempted

33. The Physical Research Laboratory (PRL), often called the cradle of India's space programme, was founded by Vikram Sarabhai in 1947 in which city?
(1) Bangalore
(2) Ahmedabad
(3) Hyderabad
(4) Thiruvananthapuram
(5) Question not attempted

34. Which of the following institutions is an exception and was NOT founded or significantly shaped by Vikram Sarabhai?
(1) Variable Energy Cyclotron Centre (VECC), Kolkata
(2) Indian Institute of Management (IIM), Ahmedabad
(3) National Institute of Design (NID), Ahmedabad
(4) Vikram A. Sarabhai Community Science Centre (VASCSC)
(5) Question not attempted

35. Arrange the following events related to the Indian space programme in the correct chronological order of their inception or launch:
A. Establishment of INCOSPAR
B. Launch of Aryabhata satellite
C. Establishment of Thumba Equatorial Rocket Launching Station (TERLS)
D. Formation of ISRO
(1) A, C, D, B
(2) C, A, B, D
(3) A, D, C, B
(4) D, A, C, B
(5) Question not attempted

36. Consider the following statements regarding Vikram Sarabhai's initiatives:
Statement I: He initiated the project for the fabrication and launch of an Indian satellite, resulting in Aryabhata.
Statement II: He opposed the idea of India developing indigenous launch vehicles, preferring to rely solely on foreign rockets.
Which of the following is correct?
(1) Both Statement I and Statement II are correct
(2) Both Statement I and Statement II are incorrect
(3) Statement I is correct but Statement II is incorrect
(4) Statement I is incorrect but Statement II is

Click Here to Buy book on Amazon

incorrect
(3) Statement I is correct but Statement II is incorrect
(4) Statement I is incorrect but Statement II is correct
(5) Question not attempted

67. Which of the following discoveries or inventions is an exception and is NOT attributed to Jagadish Chandra Bose?
(1) The invention of the iron-mercury-iron coherer
(2) The use of a semiconductor junction to detect radio waves
(3) The discovery of Bose-Einstein statistics
(4) The demonstration of fatigue in metals and plants
(5) Question not attempted

68. What was the best technological significance of J.C. Bose's use of a galena crystal in his radio wave detector?
(1) It was the first instance of using radioactive decay for power generation.
(2) It proved that crystals emit light when subjected to mechanical stress.
(3) It functioned as the first continuous wave radio transmitter.
(4) It helped establish solid-state physics and semiconductor technology.
(5) Question not attempted

69. Identify the odd one out among the scientific fields J.C. Bose contributed to during his interdisciplinary career.
(1) Radio physics
(2) Plant neurobiology
(3) Synthetic polymer chemistry
(4) Semiconductor physics
(5) Question not attempted

70. Consider the following statements about Jagadish Chandra Bose:
I. He founded the Bose Institute in Calcutta in 1917.
II. He was a pioneer of Bengali science fiction.
III. He firmly believed that there is no distinct boundary between the living and the non-living.
IV. His research in plant physiology was initially met with resistance by orthodox Western biologists.
V. He exclusively published his research in Indian journals to avoid Western scrutiny.
Which of the above statement(s) is/are correct?
(1) I, II, III, and IV only
(2) II, III, IV, and V only
(3) I, III, IV, and V only
(4) I, II, IV, and V only
(5) Question not attempted

71. The Saha ionization equation, formulated by Meghnad Saha, is fundamentally applied in astrophysics to determine which of the following?
(1) The exact distance between two spiral galaxies
(2) The gravitational collapse rate of black holes
(3) The trajectory of comets in the solar system
(4) The physical and chemical state of stellar atmospheres.
(5) Question not attempted

72. What is the core concept of thermal ionization as described by Meghnad Saha?
(1) At extremely high temperatures, collisions between atoms are energetic enough to strip electrons from them, creating ions and free electrons
(2) Atoms lose electrons and become ions solely due to exposure to ultraviolet radiation.
(3) Chemical reactions at low temperatures spontaneously generate charged ions in an aqueous solution.
(4) The radioactive decay of isotopes naturally results in ionized states regardless of temperature.
(5) Question not attempted

73. Apart from his contributions to astrophysics, Meghnad Saha played a critical role in civil administration by chairing which important committee in 1952?
(1) The States Reorganization Commission
(2) The Official Language Commission
(3) The Indian Calendar Reform Committee
(4) The University Education Commission
(5) Question not attempted

74. Identify the correct pair representing Meghnad Saha's scientific legacy.
(1) Saha equation - Links the ionization state of

NODIA

an element to temperature and pressure
(2) Saha limits - The maximum mass of a stable white dwarf star
(3) Saha-Bose statistics - Laws governing the behavior of fermions
(4) Saha constant - The fundamental physical constant relating energy to frequency
(5) Question not attempted

75. Arrange the following steps in the logical application of the Saha ionization equation to classify stars:
A. Observation of absorption lines in a star's spectrum
B. Calculation of the star's surface temperature
C. Determination of the ionization states of elements present
D. Measurement of the intensity of specific spectral lines
(1) A, D, C, B
(2) B, C, A, D
(3) A, C, D, B
(4) D, A, B, C
(5) Question not attempted

76. Which of the following statements regarding Meghnad Saha's institutional foundations is incorrect?
(1) He founded the Institute of Nuclear Physics in Calcutta, later named after him.
(2) He was the chief architect of the Indian Institute of Science (IISc), Bangalore
(3) He started the journal 'Science and Culture'.
(4) He played a key role in the establishment of the National Academy of Sciences, India.
(5) Question not attempted

77. Consider the following statements:
Statement I: According to the Saha ionization equation, an increase in temperature increases the degree of ionization of a gas.
Statement II: An increase in the electron pressure in the stellar atmosphere also increases the degree of ionization.
Which of the following is correct?
(1) Both Statement I and Statement II are correct
(2) Both Statement I and Statement II are incorrect
(3) Statement I is correct but Statement II is incorrect
(4) Statement I is incorrect but Statement II is correct
(5) Question not attempted

78. Identify the odd one out among astrophysical concepts that are unrelated to the direct application of the Saha equation.
(1) Spectral classification of stars (O, B, A, F, G, K, M)
(2) Determination of stellar photospheric temperatures
(3) Understanding the composition of the Sun's chromosphere
(4) Calculation of the expanding universe's Hubble constant
(5) Question not attempted

79. What was the primary effect of Meghnad Saha's interpretation of solar spectrum lines on the field of astrophysics?
(1) It shifted astrophysics from merely observing stellar spectra to understanding the physical conditions producing them
(2) It proved that the Sun revolves around the Earth.
(3) It demonstrated that stellar atmospheres contain no hydrogen or helium.
(4) It established the theory of general relativity in high-gravity environments.
(5) Question not attempted

80. Read the following statements and select the correct option:
Assertion (A): The Saha ionization equation allows astronomers to determine the surface temperature of stars accurately.
Reason (R): The equation quantitatively relates the observed ionization states of elements in stellar spectra to the temperature and pressure of the gas.
(1) Both A and R are true and R is the correct explanation of A.
(2) Both A and R are true but R is not the correct explanation of A.
(3) A is true but R is false.
(4) A is false but R is true.
(5) Question not attempted

81. The Government of India launched the National Quantum Mission (NQM) in 2023. What is the

Downloaded from www.pdf.tube

total budget outlay approved for this mission spanning 2023-2031?
(1) Rs. 1,500 crore
(2) Rs. 6,003 crore
(3) Rs. 10,500 crore
(4) Rs. 20,000 crore
(5) Question not attempted

82. In the context of quantum computing advances, how does a qubit fundamentally differ from a classical bit?
(1) A qubit exists in a simultaneous superposition of both 0 and 1
(2) A qubit can only be processed by optical computers utilizing photons
(3) A qubit processes data at slower speeds to ensure zero error rates
(4) A qubit relies on Newtonian mechanics instead of quantum principles
(5) Question not attempted

83. Which of the following defines the phenomenon of Quantum Entanglement, a core principle leveraged in quantum computing and communications?
(1) The ability of a quantum system to exist in multiple states at once
(2) The physical connection of two particles by an invisible microscopic string
(3) A state where two or more particles become correlated such that the state of one instantly determines the state of the other, regardless of distance
(4) The process of cooling quantum processors to temperatures near absolute zero
(5) Question not attempted

84. Which of the following statements concerning Quantum Key Distribution (QKD), recently tested by Indian agencies like ISRO and DRDO, is incorrect?
(1) It uses quantum mechanics principles to ensure highly secure communication.
(2) Any attempt by a third party to eavesdrop or intercept the key alerts the communicating parties.
(3) It enables two parties to produce a shared random secret key known only to them.
(4) QKD relies on the computational difficulty of factoring large prime numbers, much like RSA encryption.
(5) Question not attempted

85. Match the quantum term in List I with its description in List II and select the correct answer.
List I: (Quantum Term)
A. Superposition
B. Decoherence
C. Qubit
D. Quantum Supremacy
List II: (Description)
i. The loss of quantum states into the environment
ii. A quantum computer solving a problem no classical computer can solve in a feasible amount of time
iii. The basic unit of quantum information
iv. The ability to exist in multiple states simultaneously
(1) A-i, B-ii, C-iv, D-iii
(2) A-iv, B-iii, C-i, D-ii
(3) A-iv, B-i, C-iii, D-ii
(4) A-ii, B-iv, C-iii, D-i
(5) Question not attempted

86. Consider the following statements:
Statement I: The National Quantum Mission aims to develop intermediate-scale quantum computers with 50-1000 physical qubits in 8 years.
Statement II: India is the first country in the world to launch a dedicated government mission for quantum technology.
Which of the following is correct?
(1) Both Statement I and Statement II are correct
(2) Both Statement I and Statement II are incorrect
(3) Statement I is correct but Statement II is incorrect
(4) Statement I is incorrect but Statement II is correct
(5) Question not attempted

87. What is the most appropriate description of the role of institutions like the Raman Research Institute (RRI) in India's recent quantum advances?
(1) They are primarily manufacturing classical silicon chips for quantum emulators.
(2) They are responsible for entirely funding

NODIA

inflammation.
(2) They are the pharmaceutical ingredient neutralizing the virus.
(3) They are chemical tags tracking body-wide vaccine distribution.
(4) They protect fragile mRNA from degradation while facilitating cell entry.
(5) Question not attempted

104. Which of the following statements regarding India's GEMCOVAC-19 is incorrect?
(1) It requires ultra-low temperature storage at -70°C, similar to the Pfizer and Moderna vaccines
(2) It is based on mRNA technology.
(3) It received Emergency Use Authorization (EUA) from the Drugs Controller General of India (DCGI).
(4) It was developed with support from the Department of Biotechnology (DBT) under Mission COVID Suraksha.
(5) Question not attempted

105. Match the vaccine type in List I with its key indigenous Indian example in List II and select the correct answer.
List I: (Vaccine Type)
A. Whole-virion Inactivated
B. DNA Plasmid Vaccine
C. mRNA Vaccine
D. Protein Subunit Vaccine
List II: (Key Indian Indigenous Example)
i. Corbevax
ii. ZyCoV-D
iii. Covaxin
iv. GEMCOVAC-19
(1) A-i, B-ii, C-iii, D-iv
(2) A-iii, B-iv, C-ii, D-i
(3) A-iii, B-ii, C-iv, D-i
(4) A-ii, B-iii, C-i, D-iv
(5) Question not attempted

106. Consider the following statements:
Statement I: mRNA vaccines enter the nucleus of the host cell and integrate with the human genome to confer immunity.
Statement II: Once the viral protein is created by the host cell, the cell breaks down the mRNA instruction and removes it.
Which of the following is correct?
(1) Both Statement I and Statement II are correct
(2) Both Statement I and Statement II are incorrect
(3) Statement I is correct but Statement II is incorrect
(4) Statement I is incorrect but Statement II is correct
(5) Question not attempted

107. Which of the following is the most appropriate description of the primary advantage of mRNA vaccine platforms over traditional vaccine methods?
(1) They can be administered orally rather than via injection.
(2) They provide 100% lifetime immunity against all strains.
(3) They do not require clinical trials before public administration.
(4) They allow rapid redesign and scaling for emerging viral variants.
(5) Question not attempted

108. Identify the odd one out among the components typically found in a formulated mRNA vaccine.
(1) Messenger RNA sequence
(2) Attenuated live virus
(3) Lipid nanoparticles
(4) Buffer solutions and salts
(5) Question not attempted

109. What was the effect of using lyophilization (freeze-drying) technology in the development of India's indigenous mRNA vaccine?
(1) It eliminated the need for lipid nanoparticles.
(2) It converted the mRNA into a DNA plasmid for better efficacy.
(3) It ensured vaccine stability at standard refrigerator temperatures.
(4) It allowed the vaccine to be inhaled as a nasal spray.
(5) Question not attempted

110. Consider the following statements about mRNA technology advances in India:
I. India's GEMCOVAC-19 was the world's first liquid-stable mRNA vaccine.
II. mRNA technology is being explored globally for cancer immunotherapy.
III. The development of indigenous mRNA platforms reduces India's reliance on foreign

Click Here to Buy book on Amazon

Statement I: The virus is chemically treated, typically with beta-propiolactone, so it cannot replicate in human cells.
Statement II: Because the virus is dead, it cannot trigger any antibody response without multiple booster doses every month.
Which of the following is correct?
(1) Both Statement I and Statement II are correct
(2) Both Statement I and Statement II are incorrect
(3) Statement I is correct but Statement II is incorrect
(4) Statement I is incorrect but Statement II is correct
(5) Question not attempted

97. Which of the following is an exception to the general advantages of whole-virion inactivated vaccines like Covaxin?
(1) They present the entire virus to the immune system, potentially recognizing multiple viral proteins.
(2) They can be manufactured in a matter of days simply by synthesizing the genetic sequence.
(3) They have a well-established safety profile used in other vaccines like polio and rabies.
(4) They are suitable for administration to individuals with compromised immune systems as they cannot cause the disease.
(5) Question not attempted

98. What was the specific physiological effect of adding the Toll-like receptor 7/8 (TLR7/8) agonist to the Covaxin formulation?
(1) It induced a strong Th1-biased immune response, necessary for effective clearance of intracellular viral infections.
(2) It prevented the vaccine from causing allergic reactions in children.
(3) It allowed the vaccine to be administered intravenously rather than intramuscularly.
(4) It deactivated the host's innate immune system to allow the vaccine to enter cells.
(5) Question not attempted

99. Identify the odd one out among the following vaccines based on their fundamental technology platform.
(1) Covaxin
(2) Salk Polio vaccine
(3) Pfizer-BioNTech COVID-19 vaccine
(4) Rabies vaccine
(5) Question not attempted

100. Consider the following statements regarding the development of Covaxin:
I. The SARS-CoV-2 strain used for Covaxin was isolated by the National Institute of Virology, Pune.
II. It was manufactured using Vero cell culture technology.
III. It was the first Indian vaccine to receive Emergency Use Listing (EUL) from the World Health Organization.
IV. The technology transfer for Covaxin was exclusively purchased from a European pharmaceutical company.
Which of the above statement(s) is/are correct?
(1) I, II, and III only
(2) II, III, and IV only
(3) I, III, and IV only
(4) I, II, and IV only
(5) Question not attempted

101. Which Indian biotechnology company developed GEMCOVAC-19, India's first indigenous mRNA COVID-19 vaccine?
(1) Serum Institute of India
(2) Panacea Biotec
(3) Gennova Biopharmaceuticals
(4) Dr. Reddy's Laboratories
(5) Question not attempted

102. In the mechanism of mRNA vaccines, what specific instruction does the injected mRNA provide to the host cells?
(1) To directly attack and destroy the invading virus
(2) To produce a harmless piece of the target virus's protein (like the spike protein) to trigger an immune response
(3) To alter the host's DNA to permanently resist the virus
(4) To replicate the entire virus so the immune system can practice fighting it
(5) Question not attempted

103. What is the critical role of Lipid Nanoparticles (LNPs) in the formulation of mRNA vaccines?
(1) They act as an adjuvant causing localized

Downloaded from www.pdf.tube

private quantum startups in India.
(3) They are developing quantum weapons for the Indian armed forces.
(4) They are spearheading research in secure quantum communications, including satellite-based QKD.
(5) Question not attempted

88. Identify the odd one out among algorithms used in computing architectures.
(1) Bubble Sort algorithm
(2) Shor's algorithm
(3) Grover's algorithm
(4) Quantum Phase Estimation algorithm
(5) Question not attempted

89. The National Quantum Mission proposes setting up four Thematic Hubs (T-Hubs). Which of the following is an exception and is NOT one of the planned thematic areas?
(1) Quantum Computing
(2) Quantum Communication
(3) Quantum Genetic Engineering
(4) Quantum Sensing and Metrology
(5) Question not attempted

90. Consider the following statements regarding quantum technology developments in India:
I. ISRO successfully demonstrated free-space Quantum Communication over a distance of 300 meters.
II. QSim is a Quantum Computer Simulator Toolkit developed indigenously by IISc, IIT Roorkee, and C-DAC.
III. Quantum computers require operating temperatures close to absolute zero to maintain qubit stability.
Which of the above statement(s) is/are correct?
(1) I and II only
(2) II and III only
(3) I and III only
(4) I, II, and III
(5) Question not attempted

91. Covaxin, developed indigenously in India for COVID-19, is based on which of the following vaccine platforms?
(1) mRNA technology
(2) Viral vector technology
(3) Protein subunit technology
(4) Whole-virion inactivated technology
(5) Question not attempted

NODIA

92. Covaxin incorporates an adjuvant called Algel-IMDG. What is the primary conceptual role of this adjuvant in the vaccine?
(1) To act as a preservative and prevent the vaccine from spoiling at room temperature
(2) To stimulate a stronger and longer-lasting immune response, particularly T-cell immunity
(3) To neutralize the live virus present in the vaccine vial before injection
(4) To mask the pain at the site of injection
(5) Question not attempted

93. Covaxin was developed by Bharat Biotech in close collaboration with which of the following apex research institutions of India?
(1) Council of Scientific and Industrial Research (CSIR)
(2) Defence Research and Development Organisation (DRDO)
(3) Indian Council of Medical Research (ICMR) and National Institute of Virology (NIV)
(4) Department of Biotechnology (DBT)
(5) Question not attempted

94. Which of the following statements correctly identifies an advantage of the Covaxin platform during the pandemic?
(1) It required ultra-cold chain storage (-70°C) for arctic use.
(2) It required only a single dose for full lifetime immunity.
(3) It was an oral vaccine, eliminating trained vaccinators.
(4) Inactivated vaccines store at standard 2-8°C refrigerator temperatures.
(5) Question not attempted

95. Identify the correct pair matching the Indian COVID-19 vaccine with its manufacturing company.
(1) Corbevax - Biological E
(2) Covishield - Bharat Biotech
(3) ZyCoV-D - Serum Institute of India
(4) Covovax - Zydus Cadila
(5) Question not attempted

96. Consider the following statements regarding the inactivated virus mechanism used in Covaxin:

tech transfers during pandemics.
IV. Self-amplifying mRNA (saRNA) is the next generation of this technology being researched.
V. Indian mRNA vaccines use an adenovirus vector to enter cells.
Which of the above statement(s) is/are correct?
(1) I, II, III, and V only
(2) I, II, III, and IV only
(3) II, III, IV, and V only
(4) I, III, IV, and V only
(5) Question not attempted

111. The Government of India's AIRAWAT initiative is primarily related to which of the following technological domains?
(1) Artificial Intelligence Research, Analytics and Knowledge Assimilation platform
(2) Autonomous drone swarms for border security
(3) Advanced Interceptor Radars for aerospace warnings
(4) Augmented Reality in modern agricultural techniques
(5) Question not attempted

112. The Bhashini mission, launched by the Indian government, utilizes Artificial Intelligence conceptually to achieve which primary objective?
(1) To replace all human customer care executives in government departments with AI bots
(2) To break language barriers by providing a National Public Digital Platform for languages using AI models
(3) To monitor the social media behavior of citizens for predicting crime
(4) To automatically grade the answer sheets of all state board examinations
(5) Question not attempted

113. In the context of AI in healthcare in India, what defines the role of AI in disease screening programs like diabetic retinopathy detection?
(1) AI physically performs corrective eye surgery on patients.
(2) AI algorithms analyze retinal images to identify early signs of blindness without immediate need for a human ophthalmologist
(3) AI restricts patients from consuming sugary foods by monitoring their digital payment habits.
(4) AI synthesizes new drugs to cure advanced stages of the disease.
(5) Question not attempted

114. Which of the following statements correctly identifies the nodal agency that formulated the 'National Strategy for Artificial Intelligence' in India?
(1) NITI Aayog
(2) Ministry of Defence
(3) Indian Space Research Organisation
(4) National Informatics Centre
(5) Question not attempted

115. Arrange the following steps conceptually involved in deploying an AI model for predictive healthcare in an Indian public hospital:
A. Training the machine learning algorithm on the dataset
B. Collecting anonymized patient electronic health records (EHR)
C. Deploying the model for real-time risk prediction of incoming patients
D. Validating and testing the model for accuracy and bias
(1) B, A, D, C
(2) A, B, C, D
(3) B, D, A, C
(4) A, C, B, D
(5) Question not attempted

116. Consider the following statements regarding the application of AI in Indian governance:
Statement I: India's approach to AI heavily emphasizes 'Responsible AI', ensuring principles of fairness, privacy, and transparency.
Statement II: The government has mandated that all judicial decisions in lower courts must be entirely generated by AI by 2025.
Which of the following is correct?
(1) Both Statement I and Statement II are correct
(2) Both Statement I and Statement II are incorrect
(3) Statement I is correct but Statement II is incorrect
(4) Statement I is incorrect but Statement II is correct

Click Here to Buy book on Amazon

147. Which of the following is an exception regarding countries that have successfully developed and operationalized their own indigenous 5th-generation fighter jets as of 2023?
(1) United States (F-22, F-35)
(2) China (J-20)
(3) India (AMCA)
(4) Russia (Su-57)
(5) Question not attempted

148. Identify the odd one out among the distinct features that separate a 5th-generation fighter (like AMCA) from a 4th-generation fighter (like Mirage 2000).
(1) Serpentine air intakes (S-ducts) to hide engine blades
(2) Very Low Observable (VLO) stealth shaping
(3) Advanced sensor fusion providing comprehensive situational awareness
(4) External drop tanks and under-wing missile pylons as standard combat configuration
(5) Question not attempted

149. What is the primary operational effect of reducing the Radar Cross Section (RCS) of the AMCA?
(1) It allows the aircraft to carry twice the amount of payload.
(2) It enables the aircraft to land on extremely short, unpaved runways.
(3) It reduces the distance at which enemy radars track the aircraft
(4) It reduces the fuel consumption of the jet engines by 50%.
(5) Question not attempted

150. Consider the following statements regarding the Advanced Medium Combat Aircraft (AMCA) project:
I. It is being developed by the Aeronautical Development Agency (ADA).
II. The Cabinet Committee on Security (CCS) recently cleared the project for prototype development.
III. It is designed as a twin-engine fighter aircraft.
IV. It will feature a Diverterless Supersonic Inlet (DSI) for improved stealth.
V. It will replace the entire fleet of C-17 transport aircraft.
Which of the above statement(s) is/are correct?
(1) I, II, III, and IV only
(2) II, III, IV, and V only
(3) I, III, IV, and V only
(4) I, II, IV, and V only
(5) Question not attempted

NODIA

151. The India Semiconductor Mission (ISM) was launched to build a vibrant semiconductor and display ecosystem. It operates under which nodal Ministry?
(1) Ministry of Science and Technology
(2) Ministry of Commerce and Industry
(3) Ministry of Heavy Industries
(4) Ministry of Electronics and Information Technology (MeitY)
(5) Question not attempted

152. Under the India Semiconductor Mission, the DLI scheme provides financial incentives and design infrastructure support. What does DLI stand for?
(1) Design Linked Incentive
(2) Direct Logistics Integration
(3) Domestic Layout Initiative
(4) Digital Logic Indigenization
(5) Question not attempted

153. India's first major commercial semiconductor fabrication plant (Fab) is being set up by the Tata Group in partnership with Powerchip Semiconductor Manufacturing Corp (PSMC). Where is this plant located?
(1) Sanand, Gujarat
(2) Morigaon, Assam
(3) Dholera, Gujarat
(4) Sriperumbudur, Tamil Nadu
(5) Question not attempted

154. Identify the correct pair regarding recent semiconductor investments in India.
(1) Micron Technology - Setting up an ATMP facility in Gujarat
(2) CG Power - Setting up a full semiconductor manufacturing Fab in Noida
(3) Tata Electronics - Setting up a high-definition display fab in Hyderabad
(4) Renesas Electronics - Developing a next-generation quantum computer in Bangalore
(5) Question not attempted

C. Glass cockpit
D. Composite materials

List II: (Description)

i. Digital flight control systems replacing manual flight controls
ii. Reduces overall aircraft weight and radar signature
iii. Tailless design offering high maneuverability
iv. Digital electronic displays replacing traditional analog dials

(1) A-ii, B-iv, C-i, D-iii
(2) A-i, B-ii, C-iii, D-iv
(3) A-i, B-iii, C-iv, D-ii
(4) A-iii, B-i, C-ii, D-iv
(5) Question not attempted

126. Consider the following statements:
Statement I: Tejas Mk1A features an indigenous digital fly-by-wire flight control system.
Statement II: The aircraft is aerodynamically stable by design, making it flyable even without computers.
Which of the following is correct?
(1) Both Statement I and Statement II are correct
(2) Both Statement I and Statement II are incorrect
(3) Statement I is correct but Statement II is incorrect
(4) Statement I is incorrect but Statement II is correct
(5) Question not attempted

127. Which of the following statements about the indigenization of the Tejas Mk1A is incorrect?
(1) The Tejas Mk1A is currently powered by a fully indigenous Kaveri engine
(2) The airframe contains a high percentage of indigenous carbon-fibre composites.
(3) The mission computer and flight control laws are completely indigenously developed.
(4) It is equipped with an indigenous Unified Electronic Warfare Suite (UEWS).
(5) Question not attempted

128. Which of the following capabilities is an exception and is NOT a feature of the Tejas Mk1A variant?
(1) Mid-air refueling capability
(2) Twin-engine supercruise capability
(3) Beyond Visual Range (BVR) missile capability
(4) Updated electronic warfare suite
(5) Question not attempted

129. What is a primary aerodynamic effect of the tailless compound delta wing design used in the Tejas aircraft?
(1) It allows the aircraft to hover vertically like a helicopter.
(2) It provides high-alpha performance and high roll rates.
(3) It significantly increases the physical footprint of the aircraft, making it the largest fighter in the IAF.
(4) It entirely eliminates the need for an internal fuel tank.
(5) Question not attempted

130. Consider the following statements regarding the Tejas Mk1A upgrades over the initial Operational Clearance (IOC) version:

I. It includes an Active Electronically Scanned Array (AESA) radar.
II. It features improved maintainability and faster turnaround times.
III. It has a significantly larger wingspan and a secondary cockpit for a co-pilot in all single-seat versions.

Which of the above statement(s) is/are correct?
(1) I and II only
(2) II and III only
(3) I and III only
(4) I, II, and III
(5) Question not attempted

131. The INS Vikrant, India's first indigenous aircraft carrier, is formally designated as IAC-1. What does IAC stand for?
(1) Indian Assault Cruiser
(2) Integrated Aviation Command
(3) Indigenous Aircraft Carrier
(4) International Aircraft Corvette
(5) Question not attempted

132. The INS Vikrant utilizes STOBAR technology for flight operations. What is the fundamental mechanism of STOBAR?
(1) Aircraft launch vertically using rotors and land using parachutes.
(2) Aircraft launch using a steam catapult and land vertically.

Downloaded from www.pdf.tube

(3) Aircraft require no runway and use anti-gravity magnetic levitation to launch.
(4) Ski-jump engine takeoff assisted by arrestor wire landing
(5) Question not attempted

133. Which Indian public sector shipyard was responsible for the construction of INS Vikrant?
(1) Mazagon Dock Shipbuilders Limited, Mumbai
(2) Garden Reach Shipbuilders & Engineers, Kolkata
(3) Cochin Shipyard Limited, Kochi
(4) Goa Shipyard Limited, Vasco da Gama
(5) Question not attempted

134. Which of the following statements correctly highlights the indigenization achievement of INS Vikrant?
(1) 100% of the carrier's aviation complex and aircraft were designed in India.
(2) Roughly 76% of components, including warship steel, are indigenous.
(3) It is completely powered by an indigenous nuclear reactor.
(4) The arrestor gear system is the only indigenous component on the ship.
(5) Question not attempted

135. Identify the correct pair regarding the air wing intended for INS Vikrant.
(1) C-130J Hercules - Heavy lift cargo aircraft assigned to the carrier
(2) P-8I Poseidon - Carrier-borne anti-submarine aircraft
(3) HAL Prachand - Fixed-wing airborne early warning aircraft
(4) MiG-29K - Primary fighter aircraft currently operating from the carrier
(5) Question not attempted

136. Consider the following statements regarding carrier launch systems:
Statement I: The ski-jump design (STOBAR) is mechanically simpler and cheaper than a catapult system (CATOBAR).
Statement II: A ski-jump allows aircraft to take off with heavier weapon and fuel loads compared to a catapult system.
Which of the following is correct?
(1) Both Statement I and Statement II are correct
(2) Both Statement I and Statement II are incorrect
(3) Statement I is correct but Statement II is incorrect
(4) Statement I is incorrect but Statement II is correct
(5) Question not attempted

137. Which of the following is the most appropriate strategic significance of the commissioning of INS Vikrant for the Indian Navy?
(1) It allows India to establish permanent naval bases in the Atlantic Ocean.
(2) It replaces the entire fleet of conventional submarines.
(3) It joins India to an elite group constructing indigenous carriers.
(4) It gives India the capability to launch intercontinental ballistic missiles from the sea.
(5) Question not attempted

NODIA

138. Identify the odd one out among the systems/components concerning the indigenous nature of INS Vikrant.
(1) Gas turbines provided by General Electric (GE)
(2) Warship-grade steel (DMR 249A) produced by SAIL
(3) Combat Management System (CMS) developed by Tata Advanced Systems
(4) Ship's main gearboxes manufactured by Elecon Engineering
(5) Question not attempted

139. Which of the following aircraft is an exception and is NOT planned or tested for operations from INS Vikrant?
(1) MiG-29K
(2) LCA Navy (for testing/demonstration)
(3) Dassault Rafale M (Marine)
(4) Boeing B-52 Stratofortress
(5) Question not attempted

140. Consider the following statements regarding INS Vikrant:
I. It shares its name with India's first aircraft carrier, which played a vital role in the 1971 war.
II. It features an indigenous Medical Complex

equipped with modular operation theatres.
III. It is India's third currently operational aircraft carrier alongside INS Vikramaditya and INS Viraat.
IV. It uses a CATOBAR system for launching its aircraft.
Which of the above statement(s) is/are correct?
(1) I and II only
(2) II, III, and IV only
(3) I, III, and IV only
(4) I, II, and III only
(5) Question not attempted

141. India's upcoming next-generation fighter jet program is known as AMCA. What does AMCA stand for?
(1) Advanced Multi-role Combat Aircraft
(2) Aeronautical Medium Combat Aerospace
(3) Advanced Medium Combat Aircraft
(4) Armed Multipurpose Combat Airplane
(5) Question not attempted

142. The AMCA is designed as a 5th-generation stealth aircraft. What is a core principle used in stealth technology to evade radar detection?
(1) Painting the aircraft with mirrors to reflect background sky
(2) Emitting continuous loud sound waves that jam ground-based radars
(3) Flying strictly above the Earth's atmosphere during combat missions
(4) Geometric shaping and RAM materials that deflect radar waves
(5) Question not attempted

143. Which of the following best defines the "supercruise" capability planned for the AMCA?
(1) The ability to cruise at supersonic speeds without using fuel-guzzling afterburners
(2) The ability to fly at hypersonic speeds (Mach 5+) using scramjet engines
(3) The ability to cruise automatically using artificial intelligence without pilot input
(4) The capability to travel around the globe without mid-air refueling
(5) Question not attempted

144. Which of the following statements correctly identifies the propulsion strategy for the AMCA project?
(1) Both AMCA Mk1 and Mk2 will use Russian AL-31FP engines.
(2) AMCA Mk1 will use imported GE F414 engines, while Mk2 aims to use an indigenously developed higher thrust engine
(3) The aircraft is completely electrically powered to maintain absolute stealth.
(4) AMCA will rely on solid rocket boosters for continuous flight.
(5) Question not attempted

145. Match the fighter jet feature in List I with its corresponding aircraft generation in List II and select the correct answer.
List I: (Fighter Jet Feature)
A. Subsonic speed, basic unguided weapons
B. Supersonic speed, basic radar
C. Fly-by-wire, multi-role, advanced avionics
D. Stealth shaping, internal weapons bay, supercruise
List II: (Aircraft Generation)
i. 5th Generation
ii. 4th Generation
iii. 1st Generation
iv. 2nd Generation
(1) A-i, B-ii, C-iii, D-iv
(2) A-iii, B-iv, C-ii, D-i
(3) A-iv, B-iii, C-ii, D-i
(4) A-ii, B-i, C-iv, D-iii
(5) Question not attempted

146. Consider the following statements regarding the AMCA's design:
Statement I: The AMCA will feature an internal weapons bay to carry missiles and bombs.
Statement II: Carrying weapons internally significantly increases the aircraft's Radar Cross Section (RCS), making it more visible to enemy radar.
Which of the following is correct?
(1) Both Statement I and Statement II are correct
(2) Both Statement I and Statement II are incorrect
(3) Statement I is correct but Statement II is incorrect
(4) Statement I is incorrect but Statement II is correct
(5) Question not attempted

Click Here to Buy book on Amazon

(5) Question not attempted

117. Which of the following government initiatives is an exception and is NOT primarily an Artificial Intelligence or Machine Learning based platform?
(1) MyGov Corona Helpdesk (WhatsApp Chatbot)
(2) Bhashini
(3) Pragati (Pro-Active Governance And Timely Implementation)
(4) Supace (Supreme Court Portal for Assistance in Court's Efficiency)
(5) Question not attempted

118. What is the cause-and-effect relationship between India's push for data localization laws and indigenous AI development?
(1) Data localization prevents Indian companies from developing AI, stunting growth.
(2) By retaining diverse Indian datasets within the country, indigenous AI models can be trained more effectively on local contexts and languages, improving domestic AI accuracy
(3) Data localization immediately eliminates the need for any cloud computing infrastructure.
(4) It causes foreign AI models to become instantly obsolete worldwide.
(5) Question not attempted

119. Identify the odd one out among the tools categorized under India's Digital Public Infrastructure (DPI) incorporating advanced tech/AI.
(1) Aadhaar
(2) Unified Payments Interface (UPI)
(3) DigiLocker
(4) ChatGPT
(5) Question not attempted

120. Read the following statements and select the correct option:
Assertion (A): The overarching theme of India's National Strategy for AI is '#AIforAll'.
Reason (R): The government intends to leverage AI for inclusive growth, focusing on sectors like agriculture, health, and education.
(1) Both A and R are true and R is the correct explanation of A.
(2) Both A and R are true but R is not the correct explanation of A.
(3) A is true but R is false.
(4) A is false but R is true.
(5) Question not attempted

121. The Tejas Mk1A, recently inducted into the Indian Air Force, is categorized as which generation of fighter aircraft?
(1) 3rd generation
(2) 5th generation
(3) 4.5 generation
(4) 6th generation
(5) Question not attempted

122. A major upgrade in the Tejas Mk1A is the integration of an AESA radar. What does AESA stand for in this context?
(1) Active Electronically Scanned Array
(2) Airborne Early Surveillance Application
(3) Advanced Electromagnetic Spectrum Analyzer
(4) Aero-Engine Structural Augmentation
(5) Question not attempted

NODIA

123. The Tejas Light Combat Aircraft (LCA) program is primarily designed and developed by which agency?
(1) Hindustan Aeronautics Limited (HAL) solely
(2) Indian Space Research Organisation (ISRO)
(3) Bharat Electronics Limited (BEL)
(4) Aeronautical Development Agency (ADA) under DRDO
(5) Question not attempted

124. Identify the correct pair regarding the weapon systems integrated on the Tejas Mk1A.
(1) BrahMos - Short-range unguided bomb
(2) Astra - Indigenous Beyond Visual Range (BVR) Air-to-Air Missile
(3) S-400 - Internal Gatling gun
(4) Nirbhay - Air-to-air dogfight missile
(5) Question not attempted

125. Match the Tejas component or feature in List I with its description in List II and select the correct answer.
List I: (Tejas Component/Feature)
A. Fly-by-wire
B. Delta wing

155. Which of the following statements comparing an ATMP (Assembly, Testing, Marking, and Packaging) facility with a Semiconductor Fab is incorrect?
(1) A Fab involves printing the complex integrated circuits on bare silicon wafers.
(2) An ATMP facility receives finished wafers, cuts them into individual chips, and packages them for use.
(3) ATMP is the final stage of semiconductor manufacturing before the chip is mounted on a circuit board.
(4) Setting up an ATMP facility generally requires a significantly higher capital investment than setting up a full Fab.
(5) Question not attempted

156. Consider the following statements regarding India's semiconductor initiatives:
Statement I: The Government of India has committed an outlay of Rs. 76,000 crore for the development of the semiconductor and display manufacturing ecosystem.
Statement II: The scheme offers fiscal support of up to 50% of the project cost for setting up Semiconductor Fabs in India.
Which of the following is correct?
(1) Both Statement I and Statement II are correct
(2) Both Statement I and Statement II are incorrect
(3) Statement I is correct but Statement II is incorrect
(4) Statement I is incorrect but Statement II is correct
(5) Question not attempted

157. Which of the following is the most appropriate reason for the geopolitical importance of building a domestic semiconductor ecosystem in India?
(1) To completely halt the export of electronic goods to rival nations
(2) To transition the Indian economy entirely from agriculture to semiconductor manufacturing within a decade
(3) To ensure supply chain resilience by reducing geographic reliance
(4) To use chips as the primary reserve currency backing the Indian Rupee
(5) Question not attempted

158. Which of the following Indian states is an exception, having NOT recently seen the approval of a major semiconductor Fab or ATMP plant under the central ISM scheme as of early 2024?
(1) Gujarat
(2) Assam
(3) Maharashtra (via recent ATMP approvals)
(4) Bihar
(5) Question not attempted

159. What was the major global cause that dramatically accelerated India's push towards self-reliance in the semiconductor sector in recent years?
(1) The severe global chip shortage experienced during and after the COVID-19 pandemic, which paralyzed automotive and electronics manufacturing
(2) The discovery of massive silicon mines in Rajasthan
(3) A sudden ban on Indian software exports by Western countries
(4) The complete depletion of natural semiconductor materials globally
(5) Question not attempted

NODIA

160. Read the following statements and select the correct option:
Assertion (A): Many initial semiconductor investments in India are focused on ATMP/OSAT facilities rather than full-fledged Fabrication units.
Reason (R): ATMP facilities require relatively lower initial capital expenditure, have faster setup times, and help build a foundational talent pool compared to complex Fabs.
(1) Both A and R are true and R is the correct explanation of A.
(2) Both A and R are true but R is not the correct explanation of A.
(3) A is true but R is false.
(4) A is false but R is true.
(5) Question not attempted

161. The Indian National Space Promotion and Authorization Centre (IN-SPACe) was established to act as a single-window nodal agency. What is its primary role?
(1) To design and build heavy-lift launch vehicles for ISRO

V. The export of the Swathi Weapon Locating Radar to Armenia was a major breakthrough.

Which of the above statement(s) is/are correct?
(1) I, II, III, and V only
(2) II, III, IV, and V only
(3) I, III, IV, and V only
(4) I, II, IV, and V only
(5) Question not attempted

191. The Ministry of Defence launched the SRIJAN portal to promote indigenization. What is the primary purpose of this portal?
(1) To provide information on items imported by Defence Public Sector Undertakings (DPSUs) so that Indian industry can design, develop, and manufacture them domestically
(2) To allow citizens to directly purchase surplus military gear
(3) To recruit young scientists into DRDO laboratories
(4) To act as a secure communication network for the armed forces during wartime
(5) Question not attempted

192. What is the fundamental concept behind the "Positive Indigenization Lists" promulgated by the Department of Military Affairs?
(1) A list of weapons that India plans to import exclusively from Russia
(2) A list of defense items for which there is an embargo on import beyond the timeline indicated against them, mandating domestic procurement
(3) A list of obsolete weapons that the Indian armed forces will permanently scrap
(4) A list of strategic items that only DRDO is permitted to manufacture, barring the private sector
(5) Question not attempted

193. The Innovations for Defence Excellence (iDEX) initiative was launched to foster innovation and technology development. It is funded and managed by which entity?
(1) Indian Space Research Organisation (ISRO)
(2) Defence Innovation Organisation (DIO)
(3) National Security Council Secretariat (NSCS)
(4) NITI Aayog
(5) Question not attempted

194. Identify the correct pair regarding India's defence manufacturing policies.
(1) Defence Acquisition Procedure (DAP) - Promulgated in 2020 to promote 'Make in India' and 'Atmanirbhar Bharat' in defence
(2) Strategic Partnership Model - Designed to eliminate private sector involvement in defence manufacturing
(3) Srijan Portal - Launched to facilitate the import of foreign small arms
(4) iDEX - A scheme meant to purchase off-the-shelf foreign technologies without domestic R&D
(5) Question not attempted

195. Read the following statements and select the correct option:

Assertion (A): The Defence Acquisition Procedure (DAP) 2020 accords the highest priority to the Buy (Indian-IDDM) category for capital procurement.

Reason (R): The government aims to encourage indigenous design, development, and manufacturing (IDDM), thereby reducing reliance on foreign arms suppliers.
(1) Both A and R are true and R is the correct explanation of A.
(2) Both A and R are true but R is not the correct explanation of A.
(3) A is true but R is false.
(4) A is false but R is true.
(5) Question not attempted

196. Consider the following statements regarding the Strategic Partnership (SP) Model:

Statement I: It aims to establish long-term strategic partnerships with Indian private corporate entities to set up manufacturing ecosystems for major platforms.

Statement II: Under this model, Indian companies must develop technologies entirely on their own without any foreign Original Equipment Manufacturer (OEM) tie-ups.

Which of the following is correct?
(1) Both Statement I and Statement II are correct
(2) Both Statement I and Statement II are incorrect
(3) Statement I is correct but Statement II is incorrect
(4) Statement I is incorrect but Statement II is

Downloaded from www.pdf.tube

STUDYING FROM PDFs?

THINK AGAIN.

If you are studying only from PDFs,
you are wasting valuable time.

Research shows that learning from

PRINTED BOOKS has up to

4× HIGHER RETENTION

than studying from screens.

PRINT BOOK = BETTER MEMORY

PDF = LOWER RETENTION

Those who study from **PRINTED BOOKS**
move **AHEAD.**

Others are left **BEHIND**
in competition.

In competitive exams,
being average is not enough.

STAY ONE STEP AHEAD.

weapon systems for commercial sale
(5) Question not attempted

168. Identify the odd one out among the entities contributing to the Indian space economy.
(1) Liquid Propulsion Systems Centre (LPSC)
(2) Agnikul Cosmos
(3) Pixxel
(4) Bellatrix Aerospace
(5) Question not attempted

169. What is the expected cause-and-effect outcome of the successful privatization and commercialization of the SSLV program?
(1) It will cause ISRO to completely shut down its operations by 2030.
(2) It will result in all Indian private companies relocating to the United States.
(3) Transferring manufacturing to private sectors lowers costs via mass production.
(4) It will prevent any foreign satellites from launching from Indian soil.
(5) Question not attempted

170. Consider the following statements regarding India's Space Economy:
I. Foreign Direct Investment (FDI) up to 100% is now allowed under the automatic route for manufacturing satellite components and systems.
II. The space economy reforms aim to increase India's share in the global space economy from the current ~2% to around 9-10% in the future.
III. NITI Aayog strictly prohibits private startups from using ISRO's testing facilities.
Which of the above statement(s) is/are correct?
(1) I and II only
(2) II and III only
(3) I and III only
(4) I, II, and III
(5) Question not attempted

171. The 500 MWe Prototype Fast Breeder Reactor (PFBR), a critical component of India's nuclear power programme, is located at which site?
(1) Tarapur, Maharashtra
(2) Rawatbhata, Rajasthan
(3) Kaiga, Karnataka
(4) Kalpakkam, Tamil Nadu
(5) Question not attempted

172. In the context of India's nuclear energy, what defines a "closed fuel cycle"?
(1) Nuclear reactors are hermetically sealed and never refueled during their operational lifetime.
(2) Reprocessing spent fuel to extract materials for subsequent reactor stages
(3) The spent nuclear fuel is completely buried deep underground as waste without further processing.
(4) The reactor relies entirely on importing enriched uranium from foreign suppliers.
(5) Question not attempted

173. India possesses vast reserves of Thorium, critical for the third stage of its nuclear program. These reserves are primarily found in monazite sands located in:
(1) The Thar desert of Rajasthan
(2) The Himalayan glaciers in Ladakh
(3) The coastal beaches of Kerala and Odisha
(4) The dense forests of the Andaman and Nicobar Islands
(5) Question not attempted

174. Identify the correct pair matching the nuclear power station with its location state.
(1) Kudankulam Nuclear Power Plant - Andhra Pradesh
(2) Narora Atomic Power Station - Madhya Pradesh
(3) Gorakhpur Haryana Anu Vidyut Pariyojana - Punjab
(4) Kakrapar Atomic Power Station - Gujarat
(5) Question not attempted

175. Which of the following statements regarding Pressurized Heavy Water Reactors (PHWRs) in India is incorrect?
(1) They require highly enriched uranium (over 90%) to sustain a chain reaction
(2) They form the backbone of the first stage of India's nuclear power programme.
(3) They utilize natural uranium as fuel and heavy water as both moderator and coolant.
(4) KAPP-3 in Gujarat is India's first indigenously developed 700 MWe PHWR.
(5) Question not attempted

NODIA

176. Consider the following statements:
Statement I: Thorium-232 is not naturally fissile

(2) To authorize, promote, and regulate the space activities of non-governmental private entities (NGEs) in India
(3) To train Indian astronauts for the Gaganyaan mission
(4) To manage the telemetry and tracking of all foreign satellites
(5) Question not attempted

162. NewSpace India Limited (NSIL) operates under the Department of Space. What is the core conceptual mandate of NSIL?
(1) To serve as the commercial arm of ISRO, enabling Indian industries to scale up high-technology manufacturing and handling commercial launch services
(2) To conduct deep space exploratory missions to Mars and Venus
(3) To establish human colonies on the Moon
(4) To regulate the orbital debris surrounding the Earth
(5) Question not attempted

163. A key feature of the Indian Space Policy 2023 is the clear delineation of roles. Under this policy, what is the specific focus assigned to ISRO?
(1) To focus purely on commercial satellite launches and revenue generation
(2) To solely manufacture small satellites for agricultural universities
(3) To step away from commercial manufacturing and focus on advanced research, development of new technologies, and deep space exploration
(4) To disband its rocket manufacturing division and hand it entirely to foreign companies
(5) Question not attempted

164. Which of the following statements correctly differentiates the Small Satellite Launch Vehicle (SSLV) from the Polar Satellite Launch Vehicle (PSLV)?
(1) SSLV requires months to integrate, while PSLV can be integrated in days.
(2) SSLV uses only cryogenic liquid engines, whereas PSLV uses only solid propellants.
(3) SSLV is capable of lifting 10-ton satellites, while PSLV can only lift 500 kg.
(4) SSLV is designed to be assembled on demand with quick turnaround time and lower cost to cater to the growing small satellite market.
(5) Question not attempted

165. Match the space entity in List I with its mandate or activity in List II and select the correct answer.
List I: (Space Entity)
A. ISRO
B. IN-SPACe
C. NSIL
D. Skyroot Aerospace
List II: (Mandate/Activity)
i. Private space startup developing launch vehicles
ii. Advanced space research and planetary missions
iii. Commercialization of space technologies and launch services
iv. Authorization and regulation of private space sector
(1) A-i, B-ii, C-iii, D-iv
(2) A-ii, B-iii, C-iv, D-i
(3) A-ii, B-iv, C-iii, D-i
(4) A-iv, B-i, C-ii, D-iii
(5) Question not attempted

166. Consider the following statements:
Statement I: Vikram-S, launched in 2022, was India's first privately developed rocket.
Statement II: The launch of Vikram-S marked the entry of Indian private startups into the launch vehicle sector, ending ISRO's monopoly.
Which of the following is correct?
(1) Both Statement I and Statement II are correct
(2) Both Statement I and Statement II are incorrect
(3) Statement I is correct but Statement II is incorrect
(4) Statement I is incorrect but Statement II is correct
(5) Question not attempted

167. Under the recent space sector reforms in India, which of the following activities is an exception and is NOT permitted to Non-Governmental Entities (NGEs)?
(1) Establishing private launch pads
(2) Launching and operating private communication satellites
(3) Providing space-based broadband services
(4) Developing offensive anti-satellite (ASAT)

Click Here to Buy book on Amazon

(1) India exported the Pinaka Multi-Barrel Rocket Launcher system to Armenia amid its regional conflicts
(2) India sold the Pinaka system to the United States military for deployment in Europe.
(3) The Pinaka system was rejected by all foreign buyers due to reliance on foreign ammunition.
(4) Pinaka is exclusively an air-to-air missile exported to African nations.
(5) Question not attempted

185. Match the indigenous weapon system in List I with its category in List II and select the correct answer.
List I: (Indigenous Weapon System Exported/ Offered)
A. BrahMos
B. Pinaka
C. Akash
D. Advanced Light Helicopter (ALH) Dhruv
List II: (Category)
i. Surface-to-Air Missile system
ii. Multi-Barrel Rocket Launcher
iii. Supersonic Cruise Missile
iv. Utility Rotary-wing aircraft
(1) A-i, B-ii, C-iii, D-iv
(2) A-iii, B-iv, C-i, D-ii
(3) A-iii, B-ii, C-i, D-iv
(4) A-ii, B-iii, C-iv, D-i
(5) Question not attempted

186. Consider the following statements regarding the Open General Export License (OGEL):
Statement I: OGEL is a one-time export license issued by the Department of Defence Production to allow the export of specific items to specific destinations without seeking permission for every transaction.
Statement II: OGEL strictly prohibits Indian companies from exporting non-lethal defence equipment to European nations.
Which of the following is correct?
(1) Both Statement I and Statement II are correct
(2) Both Statement I and Statement II are incorrect
(3) Statement I is correct but Statement II is incorrect
(4) Statement I is incorrect but Statement II is correct
(5) Question not attempted

187. Despite a growing export footprint, India remains a significant importer of certain critical military platforms. Which of the following is an exception, being an area where India is aggressively pursuing export orders rather than importing?
(1) Heavy turbofan engines for fighter jets
(2) Long-range strategic nuclear bombers
(3) Heavy-lift military transport aircraft (like C-17)
(4) Artillery systems (like ATAGS) and Multi-Barrel Rocket Launchers
(5) Question not attempted

188. Identify the odd one out among entities contributing majorly to India's defence exports.
(1) Munitions India Limited
(2) Stockholm International Peace Research Institute (SIPRI)
(3) Bharat Electronics Limited (BEL)
(4) Hindustan Aeronautics Limited (HAL)
(5) Question not attempted

189. What has been the primary economic effect of the Ministry of Defence notifying Positive Indigenization Lists on the export sector?
(1) It has led to a complete ban on the export of any Indian weapon system.
(2) It has caused a severe shortage of weapons for the Indian Army, reducing export capacity to zero.
(3) Scaling domestic manufacturing lowers costs and boosts global competitiveness.
(4) It forced private companies to exit the defence sector completely.
(5) Question not attempted

190. Consider the following statements regarding India's Defence Exports:
I. India currently exports defence equipment to over 85 countries.
II. Private sector companies account for a significant portion of India's total defence exports.
III. Export authorization processes have been streamlined and made completely online.
IV. India exclusively exports finished weapons and refuses to export sub-assemblies or components.

NODIA

inspire researchers in theoretical mathematical fields today.

18. (1) Statistical mechanics
Srinivasa Ramanujan specialized in pure mathematics, making legendary contributions to the study of the partition function, elliptic integrals, and hypergeometric series. These areas form the core of his mathematical legacy. Statistical mechanics, while a significant field of science involving mathematical principles, was not a primary focus of his research; instead, it was more closely associated with Satyendra Nath Bose.

19. (3) The formalization and global publication of his intuitive theorems
The partnership between Ramanujan and G.H. Hardy was instrumental in bringing Ramanujan's genius to the global stage. Hardy provided the necessary formal framework and rigorous proof-writing that the mathematical community required. This collaboration resulted in the systematic publication of Ramanujan's intuitive results in prestigious journals, ensuring his groundbreaking theorems were recognized, preserved, and studied by mathematicians worldwide.

20. (1) I, II, and III only
Ramanujan was largely self-taught and became the first Indian Fellow of Trinity College, Cambridge. His birth anniversary on December 22 is honored as National Mathematics Day. While he made profound contributions to prime number theory, he did not win the Fields Medal, as the award was established in 1936, years after his untimely death in 1920.

21. (3) Homi J. Bhabha
Homi Jehangir Bhabha is universally recognized as the visionary leader who established India's nuclear research infrastructure. He founded the Tata Institute of Fundamental Research and the Atomic Energy Establishment at Trombay. His strategic planning and scientific excellence laid the groundwork for India to achieve self-reliance in nuclear energy, earning him the title of the father of the programme.

22. (2) The elastic scattering of an electron and a positron
In particle physics, Bhabha scattering refers to the specific process where an electron and its antiparticle, the positron, collide and scatter elastically. This interaction is a fundamental process in quantum electrodynamics. Homi Bhabha's theoretical derivation of the scattering cross-section for these particles remains a cornerstone of modern high-energy physics and is widely studied in accelerator experiments worldwide.

23. (4) Use of natural uranium, followed by plutonium, and eventually thorium
India's nuclear strategy, designed by Homi Bhabha, consists of three distinct stages to maximize domestic resources. The first stage uses natural uranium in heavy water reactors. The second stage utilizes plutonium produced in the first stage to fuel fast breeder reactors. The final stage aims to use India's vast thorium reserves to achieve long-term, sustainable energy independence.

24. (1) It was primarily focused on agricultural research before shifting to nuclear physics.
The Tata Institute of Fundamental Research (TIFR) was established in 1945 specifically for advanced research in physics and mathematics. Founded by Homi Bhabha with support from the Sir Dorabji Tata Trust, it was never an agricultural research center. It started at the Indian Institute of Science before moving to Mumbai, eventually becoming the cradle of India's nuclear and space programs.

25. (3) A-iii, B-iv, C-ii, D-i
India's nuclear institutions are strategically located across the country. The Bhabha Atomic Research Centre is situated in Trombay, and the Indira Gandhi Centre for Atomic Research is in Kalpakkam. The Variable Energy Cyclotron Centre operates in Kolkata, while the Atomic Minerals Directorate is headquartered in Hyderabad. These centers work together to support different aspects of the national nuclear power programme.

26. (1) Boiling Water Reactors for desalination
Homi Bhabha's three-stage plan focuses on specific reactor technologies to utilize domestic

Downloaded from www.pdf.tube

correct
(5) Question not attempted

197. Which of the following statements regarding Hindustan Aeronautics Limited (HAL) and its indigenization efforts is incorrect?
(1) HAL is the nodal agency for the design and development of the Light Combat Helicopter (LCH) Prachand.
(2) HAL operates an indigenization portal to handhold Indian MSMEs for manufacturing aircraft components.
(3) HAL has achieved 100% indigenization in the manufacturing of the AL-31FP engines for the Su-30MKI without Russian raw materials
(4) HAL has successfully indigenized various Line Replaceable Units (LRUs) for its aircraft platforms.
(5) Question not attempted

198. Which of the following is an exception to the categories prioritized for procurement under the Defence Acquisition Procedure (DAP) 2020 to boost self-reliance?
(1) Buy (Indian - IDDM)
(2) Buy (Global - Sole Source Restricted)
(3) Buy (Indian)
(4) Buy & Make (Indian)
(5) Question not attempted

199. Identify the odd one out among the DRDO laboratories/establishments based on their primary domain of research.
(1) Aeronautical Development Establishment (ADE)
(2) Gas Turbine Research Establishment (GTRE)
(3) Centre for Airborne Systems (CABS)
(4) Naval Materials Research Laboratory (NMRL)
(5) Question not attempted

200. Which of the following represents the most appropriate long-term strategic impact of India's robust defence indigenization policy?
(1) Establishing a self-sustaining industrial base for strategic autonomy
(2) Complete isolation of the Indian military from global technological advancements
(3) Rapid depletion of national budgetary resources leading to an economic recession
(4) Merging of all private sector defense companies into a single massive state-owned enterprise
(5) Question not attempted

www.nodia.in

NODIA

and cannot sustain a nuclear chain reaction on its own.
Statement II: In a reactor, Thorium-232 absorbs a neutron and transmutes into Uranium-233, which is an excellent fissile material.
Which of the following is correct?
(1) Both Statement I and Statement II are correct
(2) Both Statement I and Statement II are incorrect
(3) Statement I is correct but Statement II is incorrect
(4) Statement I is incorrect but Statement II is correct
(5) Question not attempted

177. What is the most appropriate reason for India developing Advanced Heavy Water Reactors (AHWRs)?
(1) To create a new class of nuclear-powered aircraft carriers
(2) To serve as a bridge to the Thorium-based third stage nuclear program
(3) To safely dispose of plastic waste using intense gamma radiation
(4) To generate electricity entirely without the use of water cooling systems
(5) Question not attempted

178. Which of the following Indian states is an exception and currently DOES NOT have an operational commercial nuclear power plant?
(1) Bihar
(2) Tamil Nadu
(3) Rajasthan
(4) Karnataka
(5) Question not attempted

179. Identify the odd one out concerning the materials used as a moderator in nuclear reactors.
(1) Heavy Water (D_2O)
(2) Light Water (H_2O)
(3) Boron Control Rods
(4) Graphite
(5) Question not attempted

180. Consider the following statements regarding India's 3-stage nuclear program:
I. Stage 1 utilizes Pressurized Heavy Water Reactors fueled by natural Uranium.
II. Stage 2 utilizes Fast Breeder Reactors fueled by a mixed oxide of Plutonium and Uranium.
III. Stage 3 utilizes Advanced Heavy Water Reactors fueled by Thorium-232 and Uranium-233.
IV. Fast Breeder Reactors produce more fissile material than they consume.
Which of the above statement(s) is/are correct?
(1) I, II, and III only
(2) I, III, and IV only
(3) II, III, and IV only
(4) I, II, III, and IV
(5) Question not attempted

181. The Government of India has set an ambitious target to boost defence manufacturing and exports. What is the defence export target set to be achieved by the year 2024-25?
(1) Rs. 5,000 crore
(2) Rs. 15,000 crore
(3) Rs. 35,000 crore (approx. $5 Billion)
(4) Rs. 100,000 crore
(5) Question not attempted

182. In a major milestone for India's defence exports, which Southeast Asian country became the first foreign customer to purchase the BrahMos supersonic cruise missile system?
(1) Vietnam
(2) Philippines
(3) Indonesia
(4) Malaysia
(5) Question not attempted

183. In the context of promoting defence exports, the Government of India often extends a "Line of Credit" to friendly foreign nations. What does this conceptually mean?
(1) India donates weapons to these countries for free as a diplomatic gesture.
(2) India borrows money from these countries to fund its own DRDO projects.
(3) India trades defense equipment through a barter system involving oil and minerals.
(4) Financial loans provided to foreign nations for purchasing Indian defence gear
(5) Question not attempted

184. Which of the following statements correctly highlights a recent success in India's indigenous defence exports involving the Pinaka system?

Click Here to Buy book on Amazon

9. (3) Genetic mutation in agricultural crops
Throughout his illustrious career, C.V. Raman investigated a wide range of physical phenomena. His research encompassed the acoustics of musical instruments, the physiology of human vision, and the magnetic properties of crystals. While he was deeply interested in the natural world, he did not conduct research in agricultural genetics, which was a field led by other specialized biological scientists.

10. (4) I, II, and III
Sir C.V. Raman left a profound legacy in Indian science through institutional building and diverse research. He founded the Indian Journal of Physics and discovered the Raman Effect at the Indian Association for the Cultivation of Science. Additionally, his curiosity led him to study the physics of Indian percussion instruments like the tabla and mridangam, demonstrating his interdisciplinary approach.

11. (4) The smallest number expressible as the sum of two cubes in two ways
The number 1729 is famously linked to a conversation between G.H. Hardy and Srinivasa Ramanujan. It is the smallest positive integer that can be represented as the sum of two cubes in two different ways: one cubed plus twelve cubed, and nine cubed plus ten cubed. This observation highlights Ramanujan's extraordinary intuition and deep familiarity with integers.

12. (2) Black hole thermodynamics and string theory
Srinivasa Ramanujan's work on mock theta functions, written shortly before his death, remained a mystery for decades. Modern physicists have discovered that these functions are essential for understanding the entropy of black holes. His insights into these complex mathematical structures now provide foundational tools for advanced theoretical physics research, particularly in string theory and high-energy particle physics applications.

13. (3) Positive integers possessing more divisors than any smaller positive integer
Highly composite numbers were a major area of research for Ramanujan. These are integers that have a higher count of divisors than any integer preceding them in the number sequence. His detailed study of these numbers provided deep insights into the distribution of divisors and has significant implications in number theory, helping mathematicians understand the nature of composite integers.

14. (4) Ramanujan's Pi Formula — An infinite series that converges rapidly to pi
One of Ramanujan's most significant contributions is his infinite series for calculating the mathematical constant pi. Unlike previous methods, his formulas converge at an incredibly fast rate. Modern computer algorithms used to calculate pi to billions of digits are often based on his original series, demonstrating the lasting impact of his mathematical genius on computational science and analysis.

15. (1) C, B, A, D
Srinivasa Ramanujan's career followed a specific timeline starting with his early publications in India. He first published in the Journal of the Indian Mathematical Society before moving to England to collaborate with G.H. Hardy. His excellence led to his election as a Fellow of the Royal Society, but declining health eventually forced his return to India in 1919.

16. (2) Relying on intuition and insight, often omitting formal proofs
Ramanujan possessed a unique and intuitive approach to mathematics, often stating results and identities without documenting the intermediate logical steps or formal proofs. He claimed his insights were revealed to him through divine inspiration. While Western mathematicians initially found this method unconventional, subsequent verification proved that most of his complex theorems and identities were remarkably accurate and revolutionary.

17. (3) Statement I is correct but Statement II is incorrect
Ramanujan independently discovered many advanced mathematical results that had been previously established by famous European mathematicians, often using entirely original methods. However, his work was centered on pure mathematics, including number theory and infinite series, rather than applied mathematics or mechanical engineering. His notebooks contain thousands of identities that continue to

Downloaded from www.pdf.tube

ANSWERS

1. (2) Scattering of light
Sir Chandrasekhara Venkata Raman received the Nobel Prize in Physics for his ground-breaking discovery concerning the interaction of light with matter. His research focused on how light changes wavelength when passing through transparent materials. This work successfully established that a fraction of light shifts frequency during the scattering process, which revolutionized the field of molecular spectroscopy.

2. (1) Inelastic scattering where scattered light shifts in frequency
The Raman Effect specifically refers to the inelastic scattering of photons. When monochromatic light interacts with molecules, most photons scatter elastically, maintaining their frequency. However, a minute portion exchanges energy with molecular vibrations, resulting in shifted frequencies. This shift provides a unique spectral fingerprint, allowing researchers to identify the specific chemical bonds and structures within a substance.

3. (3) The discovery of the Raman Effect
National Science Day is celebrated annually on February 28 to honor the announcement of the Raman Effect in 1928. This event serves to highlight the importance of scientific temper and acknowledge the contributions of Indian scientists. Unlike birth anniversaries, this celebration focuses on the specific date when this monumental physical discovery was formally presented to the world.

4. (1) Both Statement I and Statement II are correct
In the Raman spectrum, the frequency shifts are categorized based on energy exchange. Stokes lines occur when photons lose energy to molecules, resulting in lower scattered frequencies. Conversely, anti-Stokes lines appear when photons gain energy from vibrationally excited molecules, leading to higher scattered frequencies. Both statements accurately define these essential features observed in the inelastic scattering of light.

5. (3) A-iii, B-iv, C-ii, D-i
Indian scientists made diverse contributions across various disciplines. Sir C.V. Raman discovered the inelastic scattering of light, while Srinivasa Ramanujan worked on mock theta functions. Homi J. Bhabha developed the cosmic ray cascade theory, and Meghnad Saha formulated the ionization equation for astrophysics. These mappings accurately reflect the primary research areas and legacy of each prominent scientific figure.

6. (2) He served as the first Chairman of the Indian Space Research Organisation.
While C.V. Raman was a pioneering physicist and the first Asian Nobel laureate in science, he did not lead the Indian space program. That role was held by Vikram Sarabhai. Raman's major leadership roles included establishing the Raman Research Institute and receiving the Bharat Ratna. He focused primarily on light, acoustics, and building domestic scientific research institutions.

7. (4) Measuring the speed of moving vehicles using Doppler shift
Raman spectroscopy is utilized to identify molecular fingerprints in various materials. It is highly effective for determining chemical structures in pharmaceuticals, verifying historical artworks, and detecting specific hazardous substances like narcotics or explosives. However, measuring vehicle speed relies on the Doppler effect of radio or light waves, which is a fundamentally different physical principle than inelastic molecular scattering.

8. (1) Energy exchange between incident photons and molecular vibrational states
The shift in wavelength during Raman scattering results from the interaction between incident photons and the vibrational or rotational energy levels of molecules. When a photon collides with a molecule, it may transfer energy to it or gain energy from it. This energy exchange alters the photon's frequency, creating the distinct spectral lines used in chemical analysis.

NODIA

uranium and thorium. The stages involve Pressurised Heavy Water Reactors, Fast Breeder Reactors, and Advanced Heavy Water Reactors. While desalination is a useful application of nuclear energy, Boiling Water Reactors for that purpose are not considered a core developmental stage of the national nuclear power programme.

27. (1) Both Statement I and Statement II are correct
Homi Bhabha made significant contributions to cosmic ray research, notably developing the cascade theory with Walter Heitler. This theory explains how high-energy cosmic rays from space interact with the Earth's atmosphere to produce a shower of secondary particles. Their mathematical model accurately described the multiplication and absorption of these particles, providing deep insights into high-energy atmospheric physics processes.

28. (2) India has vast reserves of monazite sands containing thorium, but limited natural uranium resources.
The decision to center the final stage of India's nuclear programme on thorium is driven by resource availability. India holds some of the world's largest thorium deposits, primarily in the coastal monazite sands. Since domestic uranium reserves are relatively scarce, utilizing thorium ensures that the country can maintain a long-term, indigenous, and sustainable supply of carbon-free nuclear energy.

29. (3) Atomic Energy Commission of India - First Chairman
Homi J. Bhabha was the primary architect of India's nuclear policy and served as the first Chairman of the Atomic Energy Commission. In this role, he directed the nation's scientific resources toward the peaceful use of atomic energy. He also led the Department of Atomic Energy and established several key research institutes that remain central to India's technological growth today.

30. (2) I, II, IV, and V only
Homi Bhabha was a globally respected scientist who presided over the first UN conference on peaceful atomic energy. He founded the Trombay establishment and guided the construction of the Apsara reactor. Despite his tragic death in 1966, his legacy remains. Notably, he prioritized peaceful applications of nuclear energy during his tenure, rather than aggressive weaponization from the start.

31. (1) Vikram Sarabhai
Vikram Sarabhai is celebrated as the father of the Indian space programme due to his visionary leadership in establishing the necessary infrastructure. He convinced the government of the importance of space research for a developing nation. His efforts led to the creation of the Indian National Committee for Space Research and eventually the Indian Space Research Organisation.

32. (2) Satellite Instructional Television Experiment
The Satellite Instructional Television Experiment (SITE) was a pioneering project led by Vikram Sarabhai to use satellite technology for mass education. Conducted in the mid-1970s, it broadcast educational programs to thousands of Indian villages. This experiment demonstrated that satellites could effectively deliver information on health, agriculture, and family planning to remote areas, proving the societal value of space technology.

33. (2) Ahmedabad
Vikram Sarabhai founded the Physical Research Laboratory (PRL) in Ahmedabad in 1947. Initially focusing on cosmic rays and the properties of the upper atmosphere, PRL became the foundational institute where India's space program was conceived. It provided the intellectual and technical environment necessary to train the first generation of space scientists, earning it the nickname "cradle of space science."

34. (1) Variable Energy Cyclotron Centre (VECC), Kolkata
Vikram Sarabhai was a prolific institution builder who founded the Physical Research Laboratory, IIM Ahmedabad, and the National Institute of Design. He also established the Community Science Centre to promote scientific awareness. However, the Variable Energy Cyclotron Centre in Kolkata is a research unit focused on nuclear physics and was not among the primary institutions established by Sarabhai.

Click Here to Buy book on Amazon

104. (1) It requires ultra-low temperature storage at -70°C, similar to the Pfizer and Moderna vaccines
A key innovation of India's GEMCOVAC-19 is its stability at standard refrigerator temperatures. Unlike the first-generation mRNA vaccines from Pfizer and Moderna, which required specialized ultra-cold chains, the Indian version was designed to be thermotolerant. This was achieved through lyophilization, making it much easier to distribute and store using existing medical infrastructure in developing countries and rural areas.

105. (3) A-iii, B-ii, C-iv, D-i
India's COVID-19 vaccine portfolio includes diverse technological platforms. Covaxin is a whole-virion inactivated vaccine, while ZyCoV-D is a DNA plasmid vaccine. GEMCOVAC-19 represents the indigenous mRNA platform, and Corbevax is a protein subunit vaccine. This variety demonstrates the comprehensive technical capability of the Indian biotechnology sector to develop multiple types of vaccines for public health needs and global exports.

106. (4) Statement I is incorrect but Statement II is incorrect
mRNA vaccines are designed to function entirely within the cytoplasm of the cell. They do not enter the nucleus, meaning they cannot interact with or integrate into the host's DNA. After the cell uses the mRNA instructions to produce the target viral protein, the mRNA molecule is naturally broken down and removed by the cell, leaving no permanent genetic footprint in the body.

107. (4) They allow rapid redesign and scaling for emerging viral variants.
The primary advantage of mRNA technology is its flexibility and speed. Because these vaccines are based on genetic sequences rather than growing live pathogens, scientists can quickly update the code to match new viral variants. This allows for the rapid development of updated boosters. This platform provides a powerful tool for responding to fast-evolving viruses and potential future pandemics more effectively than traditional methods.

108. (2) Attenuated live virus
A formulated mRNA vaccine consists of the messenger RNA sequence, lipid nanoparticles for delivery, and various buffers and salts to maintain stability and pH levels. It does not contain any live, weakened, or killed virus particles. This makes the platform inherently safe from the risk of causing the disease it is designed to prevent, as no actual viral components are injected.

109. (3) It ensured vaccine stability at standard refrigerator temperatures.
Lyophilization, or freeze-drying, was a critical technological breakthrough for India's indigenous mRNA vaccine. By converting the vaccine into a stable powder form that can be reconstituted at the time of use, researchers eliminated the need for extreme sub-zero storage. This innovation allows the vaccine to be stored and transported at 2-8°C, making it practical for use in tropical climates and remote regions.

110. (2) I, II, III, and IV only
India's mRNA advancements include developing the world's first liquid-stable and thermotolerant mRNA vaccines. The technology is being widely researched for applications in cancer and personalized medicine. While next-generation self-amplifying mRNA is also under development, these vaccines rely on lipid nanoparticles for cell entry, rather than using an adenovirus vector, which is a characteristic of viral vector vaccines like Covishield.

111. (1) Artificial Intelligence Research, Analytics and Knowledge Assimilation platform
AIRAWAT is India's dedicated cloud computing infrastructure for Artificial Intelligence. It was established to provide a high-performance platform for researchers, startups, and government agencies to process large datasets and train complex AI models. By centralizing these resources, AIRAWAT aims to accelerate indigenous AI development and place India among the top nations in global supercomputing and artificial intelligence capabilities.

112. (2) To break language barriers by providing a National Public Digital Platform for languages using AI models
The Bhashini mission is a flagship initiative aimed at using AI to enable easy access to digital

NODIA

44. (2) Serving as Project Director for the successful SLV-3 mission
Before joining DRDO, Dr. Kalam spent two decades at ISRO, where he achieved a major milestone as the Project Director for India's first Satellite Launch Vehicle. The successful launch of SLV-3 in 1980, which placed the Rohini satellite into orbit, made India a member of the exclusive space club. This achievement demonstrated his leadership in managing complex aerospace projects.

45. (3) A-iv, B-i, C-ii, D-iii
The IGMDP missiles were designed for specific strategic and tactical purposes. Prithvi is a short-range surface-to-surface ballistic missile, while Akash serves as a surface-to-air defense system. Nag is a third-generation "fire and forget" anti-tank missile. Agni was developed as an intermediate-range ballistic missile, later evolving into a family of long-range missiles with intercontinental reach for national security.

46. (1) Both Statement I and Statement II are correct
Dr. Kalam played a pivotal role as the Chief Project Coordinator for the 1998 Pokhran-II nuclear tests. Working alongside atomic energy scientists, he ensured the technical success of the mission. The public success of these tests, combined with his leadership in the missile program, firmly established his reputation as the "Missile Man" and a national icon of scientific strength.

47. (1) The Discovery of India
Dr. Kalam was a prolific writer who inspired millions through his books like 'Wings of Fire', 'Ignited Minds', and 'India 2020'. These works detailed his life, vision for the country, and the role of youth in development. 'The Discovery of India', however, was written by Jawaharlal Nehru while he was imprisoned during the Indian independence movement.

48. (2) Achieving indigenous capability in strategic and tactical missiles
Under Dr. Kalam's leadership, the IGMDP transformed India from a nation dependent on imported missile technology to one with a robust indigenous defense base. The program successfully developed a range of missiles, providing the armed forces with critical strategic and tactical assets. This shift enhanced national security and demonstrated India's ability to develop high-end technology despite international sanctions and restrictions.

49. (2) Transforming India through science, technology, and economic growth
Technology Vision 2020 was a comprehensive roadmap developed by Dr. Kalam to transition India into a developed nation by the year 2020. The vision focused on achieving self-reliance in critical areas like food security, healthcare, infrastructure, and strategic industries. He believed that by leveraging technological innovations, India could eliminate poverty and become a global economic power with a high quality of life.

50. (4) I, II, and III
Dr. Kalam's career spanned various high-profile roles, beginning as a scientist designing hovercrafts and moving to lead strategic defense projects. He served as the Principal Scientific Adviser to the government, providing crucial technical guidance. His journey culminated in his election as the 11th President of India, where he became widely known as the "People's President" due to his popularity.

51. (3) The order of nucleotides in nucleic acids dictates the synthesis of proteins
Har Gobind Khorana's Nobel-winning research focused on deciphering the genetic code. He experimentally demonstrated how the sequence of four types of nucleotides in DNA and RNA acts as a set of instructions for building proteins. By determining which specific combinations of nucleotides produce which amino acids, his work provided the foundational understanding of how life's biological blueprint is expressed.

52. (4) Chemical synthesis of biologically active DNA is possible in a laboratory.
Dr. Khorana's successful synthesis of a functional yeast gene was a landmark achievement in molecular biology. It proved that scientists could chemically assemble a sequence of DNA in a laboratory that would function normally inside a living cell. This breakthrough opened the doors to modern biotechnology, allowing for the customized design of genetic material for research and therapeutic purposes.

Downloaded from www.pdf.tube

53. (3) A short, single-stranded synthetic sequence of nucleic acids (DNA or RNA)
An oligonucleotide is a short string of nucleotides, typically fewer than fifty, that can be synthesized chemically. Dr. Khorana pioneered the methods to create these molecules with precise sequences. Today, oligonucleotides are indispensable tools in modern science, used in various applications such as genetic testing, drug development, and as primers for the polymerase chain reaction to amplify DNA.

54. (2) Nucleotide triplets code for specific amino acids
Khorana's work confirmed that the genetic code is read in groups of three nucleotides, known as codons. Each triplet corresponds to a specific amino acid used to build proteins. This discovery was essential for understanding the translation process. While he identified these triplets, AUG is known as the universal start codon, and UAA is one of the standard stop codons.

55. (3) B, A, C
The flow of genetic information follows a specific sequence known as the central dogma of molecular biology. First, information from DNA is transcribed into messenger RNA. This mRNA is then translated into a specific sequence of amino acids to form a polypeptide chain. Finally, this chain folds into a three-dimensional structure to become a functional protein capable of biological activity.

56. (1) He was awarded the Nobel Prize in Chemistry for synthesizing the first artificial protein.
Har Gobind Khorana shared the 1968 Nobel Prize in Physiology or Medicine, not Chemistry. He was honored alongside Robert Holley and Marshall Nirenberg for their collective work on the genetic code and protein synthesis. Their research deciphered how the 64 possible three-letter codons direct the assembly of proteins, which are the essential building blocks of all living organisms.

57. (1) Both Statement I and Statement II are correct
Dr. Khorana was a pioneer in the chemical synthesis of oligonucleotides, developing techniques that allowed for precise control over nucleic acid sequences. These methods were foundational to the later development of the Polymerase Chain Reaction, which revolutionized genetic research. His ability to build DNA from scratch transformed molecular biology, providing the essential tools needed for modern genetic engineering and analysis.

58. (1) Plate tectonics
Har Gobind Khorana's research in chemical biology and genetics laid the groundwork for several modern scientific fields. His work is central to molecular genetics, genetic engineering, and the broader biotechnology industry. These fields rely on the ability to read, synthesize, and manipulate genetic material. Plate tectonics, however, is a branch of geology concerned with the Earth's crustal movements and is unrelated.

59. (4) Understanding mutations and developing genetic engineering
Cracking the genetic code allowed scientists to understand exactly how changes in DNA sequences, known as mutations, can lead to diseases or altered traits. This knowledge provided the necessary framework for genetic engineering, enabling researchers to modify organisms by inserting or changing specific genes. It transformed medicine and agriculture by allowing the production of insulin, vaccines, and genetically modified crops.

60. (1) I, II, and III only
Born in a small village in Punjab, Khorana pursued higher education in England, earning his PhD from the University of Liverpool. Later in his career, he moved into the field of chemical biology, studying the protein rhodopsin to understand human vision. Although he maintained his heritage, he became a naturalized citizen of the United States in 1966.

61. (3) To measure the extraordinarily small growth movements in plants
Jagadish Chandra Bose invented the Crescograph to observe and record the growth of plants. This highly sensitive instrument could magnify plant movements up to ten thousand times, making nearly invisible growth processes apparent. Through this invention, Bose provided empirical evidence that plants react to various external stimuli, establishing a scientific link between the biological responses of plants and animals.

NODIA

62. (4) Millimeter waves have higher frequencies and shorter wavelengths than standard microwaves.
J.C. Bose was a pioneer in generating electromagnetic waves in the millimeter range, specifically around 60 GHz. These waves have significantly higher frequencies and shorter wavelengths compared to the standard microwaves used in early radio experiments. His work on these high-frequency waves laid the early groundwork for modern technologies like satellite communication, high-speed wireless data, and contemporary 5G networks.

63. (1) Plants possess a nervous system analogous to animals and respond via electrical signals.
J.C. Bose's research revolutionized the understanding of plant life by demonstrating that plants are not passive organisms. He showed that plants respond to external stimuli like light, touch, and temperature through electrical impulses, similar to the nervous systems found in animals. This interdisciplinary approach challenged contemporary views and laid the foundations for the modern field of plant neurobiology.

64. (2) The Institute of Electrical and Electronics Engineers (IEEE) recognized his 1895 demonstration of millimeter-wave communication as an IEEE Milestone.
The global scientific community has formally recognized J.C. Bose's pioneering contributions to wireless technology. The IEEE designated his 1895 public demonstration of wireless communication using millimeter waves as a historic milestone. This recognition solidifies his role as one of the inventors of radio technology, alongside Marconi and Tesla, particularly for his use of advanced high-frequency electromagnetic waves.

65. (2) A-ii, B-i, C-iv, D-iii
J.C. Bose's diverse scientific contributions include the invention of the Crescograph for magnifying plant growth and the use of galena crystals as early semiconductor detectors. He was a pioneer in generating millimeter waves at frequencies around 60 GHz. Furthermore, his work in plant physiology demonstrated that living and non-living matter can exhibit similar electrical responses to various external stimuli.

66. (3) Statement I is correct but Statement II is incorrect
In 1895, J.C. Bose publicly demonstrated the wireless transmission of electromagnetic waves in Calcutta, achieving this feat before Marconi's famous patent. However, Bose was a firm believer in the free exchange of scientific knowledge and initially refused to patent his inventions for personal profit. He only filed for a US patent later under pressure from his peers and friends.

67. (3) The discovery of Bose-Einstein statistics
Jagadish Chandra Bose is known for inventing the iron-mercury-iron coherer and using semiconductor junctions to detect radio waves. He also conducted extensive research on the fatigue of metals and plants. However, Bose-Einstein statistics, which describes the behavior of a specific class of subatomic particles, was formulated by Satyendra Nath Bose in collaboration with Albert Einstein in the 1920s.

68. (4) It helped establish solid-state physics and semiconductor technology.
By using a galena crystal to detect radio waves, J.C. Bose created the world's first semiconductor-based device for receiving wireless signals. This innovation was a significant departure from contemporary vacuum-tube based detectors. His work provided the early experimental evidence for the semiconductor properties of crystals, eventually leading to the development of the transistor and the entire field of modern solid-state electronics.

69. (3) Synthetic polymer chemistry
Jagadish Chandra Bose had a remarkably interdisciplinary career, making foundational contributions to radio physics, plant neurobiology, and semiconductor physics. He successfully applied physical methods to study biological processes and electromagnetic phenomena. While he was a pioneer in many experimental fields, he did not conduct research in synthetic polymer chemistry, which emerged as a major industrial field later in the 20th century.

70. (1) I, II, III, and IV only
J.C. Bose was a multifaceted visionary who established the Bose Institute and wrote early Bengali science fiction. He believed in the fundamental unity of all matter and conducted

Click Here to Buy book on Amazon

35. (1) A, C, D, B
The Indian space program progressed through several key milestones in the mid-20th century. It began with the establishment of INCOSPAR in 1962, followed by the setting up of the Thumba Equatorial Rocket Launching Station. ISRO was formally created in 1969 to streamline space activities. Finally, this journey culminated in the launch of India's first satellite, Aryabhata, in 1975.

36. (3) Statement I is correct but Statement II is incorrect
Vikram Sarabhai was the visionary who set the goal for India to design and launch its own satellites, a dream realized with the Aryabhata mission. Contrary to any opposition, he was a strong advocate for indigenous technology. He believed that for space applications to be truly effective for national development, India must build its own rockets and satellites.

37. (3) Assuming the AEC chairmanship after Homi J. Bhabha's death
Following the sudden and tragic demise of Homi J. Bhabha in 1966, Vikram Sarabhai was appointed as the Chairman of the Atomic Energy Commission. In this capacity, he successfully managed both the nuclear and space programs simultaneously. He ensured continuity in India's nuclear research while accelerating the development of space technologies for communication and remote sensing applications.

38. (2) Applying space technology to communication and weather forecasting
Vikram Sarabhai's vision for India was not about competing with advanced nations in a space race or moon landings. Instead, he emphasized the practical application of space technology to solve real-world problems. He prioritized using satellites for mass communication, educational broadcasting, and weather forecasting to benefit the agrarian economy and promote national development for the common citizen.

39. (4) Geosynchronous Satellite Launch Vehicle (GSLV) Mk III
In the early years, India's space program focused on atmospheric research using sounding rockets. This included the use of imported Nike-Apache rockets and the development of the indigenous Rohini series. The GSLV Mk III is a modern, high-capacity launch vehicle designed for heavy satellites and human spaceflight, belonging to a much later phase of technological evolution in ISRO's history.

40. (1) Both A and R are true and R is the correct explanation of A.
Vikram Sarabhai championed satellite technology specifically for its potential to transform rural India. He believed that tools like broadcasting and remote sensing were not luxuries but necessities for a developing country. His focus on these areas was rooted in the firm conviction that advanced science should serve national goals like education, improved agriculture, and efficient resource management.

41. (3) 1983
The Integrated Guided Missile Development Programme (IGMDP) was a strategic initiative launched by the Indian government in 1983. Managed by the Defence Research and Development Organisation, it aimed to achieve self-reliance in missile technology. Dr. A.P.J. Abdul Kalam was appointed as the chief executive, leading the development of several iconic missile systems that form India's strategic deterrent today.

42. (1) Provision of Urban Amenities to Rural Areas
Dr. Kalam advocated for the PURA model to bridge the developmental gap between cities and villages. The concept involves providing four types of connectivity to rural clusters: physical, electronic, knowledge, and economic. By ensuring that rural areas have access to modern infrastructure and opportunities, he believed India could achieve balanced national growth and reduce the migration pressure on urban centers.

43. (4) BrahMos
The original IGMDP included five specific missile projects: Prithvi, Agni, Trishul, Akash, and Nag. These covered various roles from surface-to-surface to anti-tank capabilities. The BrahMos is a supersonic cruise missile developed later through a successful joint venture between India and Russia. While a critical part of the current arsenal, it was not part of the initial 1983 programme.

NODIA

79. (1) It shifted astrophysics from merely observing stellar spectra to understanding the physical conditions producing them
Before Saha's work, stellar spectroscopy was largely a tool for cataloging stars without understanding the underlying physics. His interpretation of spectral lines allowed scientists to calculate the actual temperature and pressure of stellar gases. This shift enabled astronomers to build physical models of stars, marking the birth of modern astrophysics where observations are linked to fundamental thermodynamic and atomic principles.

80. (1) Both A and R are true and R is the correct explanation of A.
The Saha ionization equation provides a robust mathematical framework that relates the observable characteristics of a star's light to its physical state. By analyzing which atoms are ionized and to what degree, astronomers can accurately deduce the surface temperature. The reason correctly identifies that the quantitative relationship between ionization, temperature, and pressure is what makes this determination scientifically possible.

81. (2) Rs. 6,003 crore
The Government of India approved the National Quantum Mission in 2023 with a total budget outlay of Rs. 6,003 crore. This funding is dedicated to research and development in quantum technologies from 2023 to 2031. The mission aims to make India a global leader in the field by fostering innovation in quantum computing, communication, sensing, and metrology.

82. (1) A qubit exists in a simultaneous superposition of both 0 and 1
In classical computing, a bit is the basic unit of information and can only exist as either 0 or 1. A quantum bit, or qubit, leverages the principle of superposition, allowing it to represent both 0 and 1 simultaneously. This property enables quantum computers to perform complex calculations in parallel, potentially solving certain problems much faster than any classical supercomputer.

83. (3) A state where two or more particles become correlated such that the state of one instantly determines the state of the other, regardless of distance
Quantum entanglement is a phenomenon where particles become deeply linked, such that the quantum state of one particle cannot be described independently of the others. Even if separated by vast distances, a measurement on one particle immediately influences the state of the entangled partner. This principle is fundamental for developing secure quantum communication networks and high-speed quantum computing architectures.

NODIA

84. (4) QKD relies on the computational difficulty of factoring large prime numbers, much like RSA encryption.
Quantum Key Distribution is unique because its security is guaranteed by the fundamental laws of physics rather than mathematical complexity. Unlike RSA encryption, which can be broken by powerful computers solving difficult math problems, QKD uses quantum states of light to detect any attempted eavesdropping. If an interceptor tries to measure the key, the quantum state changes, immediately alerting the users.

85. (3) A-iv, B-i, C-iii, D-ii
Quantum technology involves several key concepts: superposition allows multiple simultaneous states, while decoherence represents the loss of these states due to environmental interaction. A qubit is the fundamental unit of quantum information. Quantum supremacy is achieved when a quantum processor performs a specific task that would be practically impossible for the most powerful classical supercomputers to complete.

86. (3) Statement I is correct but Statement II is incorrect
The National Quantum Mission aims to develop intermediate-scale quantum computers with 50 to 1000 qubits over an eight-year period. While this is a significant national initiative, India is not the first country to launch a dedicated government mission for quantum technology; several other nations, including the United States, China, and Canada, had already established similar large-scale national programs.

research that challenged Western biological orthodoxy. While he promoted Indian science, he regularly published his results in prestigious international journals like 'Nature' and the 'Proceedings of the Royal Society'.

71. (4) The physical and chemical state of stellar atmospheres.
The Saha ionization equation is a fundamental tool in astrophysics that relates the ionization state of an element to the temperature and pressure of a gas. By applying this equation to the observed spectral lines of stars, astronomers can determine their surface temperatures and chemical compositions. This breakthrough allowed for the quantitative physical classification of stars based on their actual properties.

72. (1) At extremely high temperatures, collisions between atoms are energetic enough to strip electrons from them, creating ions and free electrons
Thermal ionization is the process where atoms in a gas become ionized due to high-energy thermal collisions. Meghnad Saha's theory explains that as temperature increases, atoms move faster and collide more violently. These collisions eventually overcome the binding energy of the electrons, causing them to be ejected. This concept is vital for understanding the plasma state found in stellar atmospheres.

73. (3) The Indian Calendar Reform Committee
Beyond his scientific achievements, Meghnad Saha was deeply involved in national planning and civil reform. In 1952, he chaired the Indian Calendar Reform Committee, which sought to standardize the various traditional calendars used across the country. His efforts led to the adoption of the Indian National Calendar, based on scientific astronomical principles, which is still used by the government.

74. (1) Saha equation - Links the ionization state of an element to temperature and pressure
Meghnad Saha's most enduring legacy is the Saha equation, which provides the mathematical link between a gas's temperature, pressure, and its degree of ionization. This equation transformed astrophysics from a descriptive science into a quantitative physical discipline. While other scientists worked on white dwarfs and fermions, Saha's specific focus on ionization remains the cornerstone for analyzing the spectra of celestial bodies.

75. (1) A, D, C, B
To classify a star using Saha's theory, astronomers first observe the absorption lines in the stellar spectrum. They then measure the intensity of these specific lines to gauge the abundance of different elements. By applying the Saha equation, they determine the ionization states of those elements, which finally allows for an accurate calculation of the star's actual surface temperature.

76. (2) He was the chief architect of the Indian Institute of Science (IISc), Bangalore
Meghnad Saha was a key figure in building India's scientific infrastructure, founding the Saha Institute of Nuclear Physics and the journal 'Science and Culture'. He also helped establish the National Academy of Sciences. However, he was not the architect of the Indian Institute of Science in Bangalore; that institution was founded earlier through the vision of Jamsetji Tata and Swami Vivekananda.

77. (3) Statement I is correct but Statement II is incorrect
According to the Saha equation, increasing the temperature of a gas provides more energy for ionization, thereby increasing the degree of ionization. However, an increase in electron pressure actually drives the reaction in the opposite direction, promoting the recombination of ions and electrons into neutral atoms. Therefore, higher electron pressure leads to a lower degree of ionization in a stellar atmosphere.

78. (4) Calculation of the expanding universe's Hubble constant
The Saha equation is primarily used to understand the physical conditions of stellar surfaces. It is essential for spectral classification, determining photospheric temperatures, and analyzing the composition of the solar chromosphere. The Hubble constant, however, relates to the rate of expansion of the universe and large-scale cosmic distances, which is a field of cosmology independent of stellar ionization physics.

Downloaded from www.pdf.tube

E developed Corbevax, a protein subunit vaccine. Bharat Biotech is the manufacturer of Covaxin, while the Serum Institute of India produced Covishield and Covovax. Zydus Cadila developed ZyCoV-D, which is a DNA-based vaccine. Each company utilized different scientific platforms to contribute to the national and global pandemic response.

96. (3) Statement I is correct but Statement II is incorrect
During the production of Covaxin, the live virus is treated with beta-propiolactone, which permanently disables its ability to replicate while keeping its structure intact. Even though the virus is "dead," it is highly effective at triggering an immune response. The body's immune system recognizes the viral proteins and generates antibodies and memory cells, providing protection without the need for monthly boosters.

97. (2) They can be manufactured in a matter of days simply by synthesizing the genetic sequence.
Whole-virion inactivated vaccines have several advantages, including a proven safety record and the ability to present multiple viral proteins to the immune system. However, their manufacturing process is relatively slow and complex compared to mRNA vaccines. They require growing large batches of the live virus in specialized biocontainment facilities, a process that takes significantly longer than synthesizing a genetic sequence.

98. (1) It induced a strong Th1-biased immune response, necessary for effective clearance of intracellular viral infections.
The inclusion of a TLR7/8 agonist in Covaxin was a strategic scientific choice to improve the vaccine's efficacy. This specific component helps direct the immune system toward a Th1-biased response, which is particularly effective at fighting viral infections. This type of response ensures that the body produces the right kinds of cells and antibodies needed to neutralize the virus and clear infected cells.

99. (3) Pfizer-BioNTech COVID-19 vaccine
Covaxin, the Salk Polio vaccine, and the standard Rabies vaccine are all based on the whole-virion inactivated platform, where a killed version of the pathogen is used to trigger immunity. The Pfizer-BioNTech vaccine, however, utilizes messenger RNA technology, which is a fundamentally different approach. It uses genetic instructions to prompt the body's own cells to produce a specific viral protein.

100. (1) I, II, and III only
Covaxin was developed using a strain isolated by NIV Pune and manufactured using established Vero cell culture technology. It achieved international recognition by receiving the Emergency Use Listing from the World Health Organization. Importantly, the technology was developed indigenously in India through a partnership between national research institutes and a domestic company, rather than being purchased from overseas.

101. (3) Gennova Biopharmaceuticals
Gennova Biopharmaceuticals, based in Pune, developed GEMCOVAC-19, which is India's first indigenous mRNA vaccine for COVID-19. This achievement placed India among a small group of nations capable of producing mRNA-based medical products. The project was supported by the Department of Biotechnology and represents a significant milestone in India's capacity for high-tech pharmaceutical innovation and pandemic preparedness.

102. (2) To produce a harmless piece of the target virus's protein (like the spike protein) to trigger an immune response
mRNA vaccines work by delivering a small piece of genetic code to the body's cells. This code serves as a set of instructions that tells the cells to build a specific protein found on the surface of the virus, such as the spike protein. Once the protein is produced, the immune system recognizes it as foreign and learns how to defend against it.

103. (4) They protect fragile mRNA from degradation while facilitating cell entry.
Messenger RNA is highly unstable and would be quickly broken down by enzymes in the body if injected directly. To solve this, mRNA is encased in Lipid Nanoparticles. These tiny fat bubbles protect the genetic material as it travels through the body and help it merge with cell membranes. This ensures that the mRNA can safely enter the host cells to deliver its instructions.

87. (4) They are spearheading research in secure quantum communications, including satellite-based QKD.
The Raman Research Institute plays a leading role in India's quantum research, particularly in the domain of secure communications. They are actively collaborating with agencies like ISRO to develop satellite-based Quantum Key Distribution. Their work focuses on establishing long-distance quantum links through free space, which is a critical step toward building a secure, nationwide quantum communication infrastructure for strategic and commercial use.

88. (1) Bubble Sort algorithm
Shor's algorithm, Grover's algorithm, and Quantum Phase Estimation are specifically designed to run on quantum computers to solve complex problems like factoring and searching exponentially faster. Bubble Sort is a traditional sorting algorithm used in classical computer science. While it is a standard tool for conventional programming, it does not utilize quantum mechanics and is not categorized as a quantum algorithm.

89. (3) Quantum Genetic Engineering
The National Quantum Mission is structured around four primary Thematic Hubs located at top academic and R&D institutes. These hubs focus on Quantum Computing, Quantum Communication, Quantum Sensing and Metrology, and Quantum Materials and Devices. These areas represent the most promising applications of quantum science. Quantum Genetic Engineering is currently not a recognized or planned thematic area under this national mission.

90. (4) I, II, and III
India has made significant strides in quantum technology, including successful free-space communication demonstrations by ISRO. The development of the QSim toolkit provides a platform for researchers to simulate quantum circuits on classical computers. Furthermore, achieving quantum stability typically requires extremely low temperatures near absolute zero to prevent decoherence, a challenge addressed by modern cryogenic systems used in quantum research laboratories.

91. (4) Whole-virion inactivated technology
Covaxin is an indigenous Indian vaccine developed using the whole-virion inactivated platform. This traditional technology involves growing the SARS-CoV-2 virus in large quantities and then "killing" or inactivating it using chemicals. The dead virus cannot cause disease or replicate within the body, but it remains intact enough to be recognized by the immune system, which then develops a protective response.

92. (2) To stimulate a stronger and longer-lasting immune response, particularly T-cell immunity
Adjuvants are substances added to vaccines to enhance the body's immune response. Covaxin uses a unique adjuvant called Algel-IMDG, which specifically helps in generating a robust T-cell response. This is important because while antibodies block the virus from entering cells, T-cells help identify and destroy already infected cells, providing more comprehensive and durable protection against the viral infection.

93. (3) Indian Council of Medical Research (ICMR) and National Institute of Virology (NIV)
Covaxin was the result of a highly successful public-private partnership in India. The SARS-CoV-2 virus was first isolated and characterized by the National Institute of Virology in Pune. This viral strain was then transferred to Bharat Biotech for large-scale development and manufacturing. The Indian Council of Medical Research provided crucial scientific support and oversight throughout the clinical trial and development process.

94. (4) Inactivated vaccines store at standard 2-8°C refrigerator temperatures.
One of the major advantages of Covaxin during the global rollout was its ease of storage and transport. Unlike mRNA vaccines that require extremely cold temperatures, Covaxin remains stable at standard refrigerator temperatures of 2-8°C. This made it highly suitable for India's existing immunization infrastructure, allowing for easier distribution to remote rural areas without the need for specialized ultra-cold storage equipment.

95. (1) Corbevax - Biological E
India's vaccine landscape involves several different companies and technologies. Biological

Click Here to Buy book on Amazon

services in various Indian languages. It leverages machine translation and speech recognition to bridge the communication gap between different linguistic groups. By providing a public digital platform for language technology, the government aims to ensure that technology is inclusive and accessible to every citizen in their mother tongue.

113. (2) AI algorithms analyze retinal images to identify early signs of blindness without immediate need for a human ophthalmologist
In healthcare, AI is being used as a powerful screening tool to detect diseases early, especially in areas with fewer specialists. AI systems can be trained to analyze retinal scans for signs of diabetic retinopathy with high accuracy. This allows for rapid, large-scale screening in rural clinics, where the software identifies patients at risk, who can then be referred to specialists for treatment.

114. (1) NITI Aayog
NITI Aayog is the nodal agency responsible for formulating the 'National Strategy for Artificial Intelligence' in India. The strategy, titled '#AIforAll', focuses on leveraging AI for social inclusion and economic growth. It identifies five key sectors—healthcare, agriculture, education, smart cities, and infrastructure—where AI can have the most significant impact on the lives of citizens and the overall national economy.

115. (1) B, A, D, C
Deploying an AI model follows a logical progression starting with data preparation. First, anonymized health records are collected to form a dataset. This data is then used to train the machine learning algorithm. After training, the model must be rigorously validated and tested for accuracy and bias. Finally, once proven reliable, the model is deployed in clinical settings for real-time patient risk prediction.

116. (3) Statement I is correct but Statement II is incorrect
India's AI policy strongly emphasizes "Responsible AI," which prioritizes ethics, transparency, and the protection of citizen privacy. While the government encourages the use of AI to assist in various administrative and judicial tasks to improve efficiency, there is no mandate to replace human judges with AI. Decisions in the legal system continue to be made by qualified judicial officers, supported by digital tools.

117. (3) Pragati (Pro-Active Governance And Timely Implementation)
Several government initiatives now incorporate AI, such as Bhashini for translations, Supace for judicial efficiency, and chatbots for citizen assistance. PRAGATI, however, is a multi-modal platform for interactive governance and project monitoring. It primarily uses video conferencing and geospatial technology to track the progress of various infrastructure projects and government schemes, rather than relying on AI-driven automated decision-making or language models.

118. (2) By retaining diverse Indian datasets within the country, indigenous AI models can be trained more effectively on local contexts and languages, improving domestic AI accuracy
Data localization laws require that data generated within India be stored and processed domestically. For AI development, this is crucial because it ensures that high-quality, diverse local data remains available for Indian researchers and companies. Training AI models on local datasets makes them more accurate and culturally relevant for Indian users, particularly for applications in local languages, agriculture, and regional healthcare.

119. (4) ChatGPT
India's Digital Public Infrastructure consists of foundational tools like Aadhaar for identity, UPI for payments, and DigiLocker for document storage. These are state-backed platforms designed to provide essential services to all citizens. ChatGPT is a generative AI tool developed by a private foreign company, OpenAI. While it is a popular application, it is not part of India's indigenous public digital infrastructure.

120. (1) Both A and R are true and R is the correct explanation of A.
The '#AIforAll' campaign reflects India's commitment to using artificial intelligence as a tool for inclusive social development. The government believes that AI should not just benefit a few but should be harnessed to solve large-scale problems in healthcare, education,

NODIA

137. (3) It joins India to an elite group constructing indigenous carriers.
The commissioning of INS Vikrant has profound strategic importance as it establishes India as a global naval power with the proven ability to design and build its own aircraft carriers. This capability ensures that India can maintain a strong maritime presence and protect its interests across the Indian Ocean Region. It reduces long-term dependence on foreign shipyards and strengthens the domestic defense industrial base.

138. (1) Gas turbines provided by General Electric (GE)
While INS Vikrant features a high percentage of indigenous systems, some critical components are sourced from international partners. The warship-grade steel, combat management system, and main gearboxes were all developed or manufactured by Indian companies like SAIL, Tata, and Elecon. The gas turbines used for propulsion, however, are LM2500 models provided by the American company General Electric, representing an imported technology in the ship's design.

139. (4) Boeing B-52 Stratofortress
The flight deck of INS Vikrant is designed for carrier-capable aircraft like the MiG-29K and the naval version of the Tejas LCA. Future considerations include the Rafale M or F/A-18 Super Hornet. The Boeing B-52 is a massive, long-range strategic bomber designed for land-based operations; its size and weight make it entirely unsuitable for operation from any aircraft carrier, including the Vikrant.

140. (1) I and II only
INS Vikrant carries the legacy of India's first carrier and features modern facilities like an advanced Medical Complex. However, it is currently one of only two operational carriers, alongside INS Vikramaditya, as INS Viraat has been decommissioned. Furthermore, Vikrant utilizes the STOBAR system with a ski-jump and arrestor wires for flight operations, rather than the catapult-based CATOBAR system used on larger carriers.

141. (3) Advanced Medium Combat Aircraft
AMCA stands for the Advanced Medium Combat Aircraft, which is India's flagship program to develop an indigenous fifth-generation fighter jet. This project aims to provide the Indian Air Force with a highly advanced, twin-engine aircraft capable of performing diverse missions in contested environments. The AMCA will incorporate cutting-edge technologies like stealth, supercruise, and advanced sensor fusion to ensure air superiority.

142. (4) Geometric shaping and RAM materials that deflect radar waves
Stealth technology relies on making an aircraft difficult to detect by radar. This is achieved through geometric shaping, which uses flat, angled surfaces to reflect radar waves away from the source rather than back to it. Additionally, the aircraft is coated with Radar Absorbent Materials (RAM) that "soak up" electromagnetic energy, further reducing the overall radar cross-section and visibility to enemy tracking systems.

143. (1) The ability to cruise at supersonic speeds without using fuel-guzzling afterburners
Supercruise is a highly desirable feature for modern fighter jets, allowing them to fly faster than the speed of sound for extended periods. Most older jets require afterburners to reach supersonic speeds, which consumes fuel very rapidly. Supercruise enables the AMCA to travel quickly and efficiently, increasing its combat range and allowing it to intercept threats or escape danger more effectively.

144. (2) AMCA Mk1 will use imported GE F414 engines, while Mk2 aims to use an indigenously developed higher thrust engine
The propulsion strategy for AMCA involves two phases to balance project timelines with indigenization goals. The initial Mk1 version will be powered by the reliable General Electric F414 engine. For the subsequent Mk2 version, India plans to collaborate with a foreign partner to indigenously develop a more powerful engine with higher thrust, ensuring that the final version of the aircraft is truly self-reliant.

145. (2) A-iii, B-iv, C-ii, D-i
Fighter jet generations are defined by specific technological leaps. First-generation jets were subsonic with basic weapons. Second-generation aircraft introduced supersonic speeds and radar. Fourth-generation fighters featured fly-by-wire

Downloaded from www.pdf.tube

next-generation fighter jets like the upcoming AMCA.

129. (2) It provides high-alpha performance and high roll rates.
The tailless compound delta wing design is a defining aerodynamic feature of the Tejas. This shape allows the aircraft to maintain control at high angles of attack, known as high-alpha performance, which is crucial for close-range dogfighting. Additionally, this configuration enables very high roll rates, making the Tejas exceptionally agile and capable of performing rapid maneuvers that can out-turn many contemporary fighter aircraft.

130. (1) I and II only
The Mk1A variant introduces several critical upgrades to the Tejas platform, including an AESA radar and improved electronic warfare systems. It also focuses on enhanced maintainability, allowing for faster turnaround times between missions. However, the Mk1A maintains the same basic single-seat configuration and wingspan as the initial version; it does not add a second cockpit or significantly change the aircraft's physical dimensions.

131. (3) Indigenous Aircraft Carrier
The INS Vikrant is officially designated as IAC-1, which stands for Indigenous Aircraft Carrier 1. This designation highlights that the vessel was designed and built within India, marking a major milestone in the nation's naval shipbuilding capabilities. Its commissioning made India one of the few countries in the world with the technical expertise to construct such large and complex warships entirely domestically.

132. (4) Ski-jump engine takeoff assisted by arrestor wire landing
STOBAR stands for Short Take-Off But Arrested Recovery. On the INS Vikrant, aircraft take off using their own power assisted by a curved "ski-jump" at the bow, which helps them gain altitude quickly. For landing, the aircraft use a tailhook to catch one of several strong arrestor wires stretched across the deck, which rapidly brings the fast-moving jet to a complete stop.

133. (3) Cochin Shipyard Limited, Kochi
The construction of the INS Vikrant was undertaken by Cochin Shipyard Limited in Kochi, Kerala. This project was the largest and most complex shipbuilding endeavor ever handled by an Indian shipyard. It involved coordinating thousands of components, specialized warship-grade steel, and advanced engineering systems, demonstrating the shipyard's ability to meet the rigorous standards required for modern naval aviation platforms.

134. (2) Roughly 76% of components, including warship steel, are indigenous.
INS Vikrant is a testament to India's "Atmanirbhar Bharat" initiative, with approximately 76% of its components being sourced domestically. This includes the high-grade warship steel produced by the Steel Authority of India and various complex systems like the combat management system. While some specialized components are still imported, the high level of indigenous content signifies a major shift toward self-reliance in strategic naval technology.

NODIA

135. (4) MiG-29K - Primary fighter aircraft currently operating from the carrier
The air wing of INS Vikrant is designed to operate a mix of fighter jets and helicopters. Currently, the Russian-origin MiG-29K serves as the primary multi-role fighter for the carrier. In the future, the navy plans to induct more advanced fighters, possibly including the indigenous Twin Engine Deck Based Fighter or other modern naval aircraft, to enhance the carrier's strike and defense capabilities.

136. (3) Statement I is correct but Statement II is incorrect
The ski-jump system (STOBAR) is mechanically simpler and more cost-effective than catapult-based systems because it does not require complex steam or electromagnetic launch machinery. However, this comes at a performance cost; aircraft taking off from a ski-jump are limited in the amount of fuel and heavy weaponry they can carry compared to those launched with the extra power of a catapult.

186. (3) Statement I is correct but Statement II is incorrect
The Open General Export License is a major policy reform designed to simplify the export process for Indian companies. It provides a pre-approved authorization for exporting specific, non-sensitive items to certain destinations, reducing administrative delays. Far from prohibiting exports, the system is meant to encourage the global sale of various defense components and subsystems, including to European nations, provided they meet the specified safety and diplomatic criteria.

187. (4) Artillery systems (like ATAGS) and Multi-Barrel Rocket Launchers
While India still imports certain complex technologies like heavy jet engines and transport aircraft, it has achieved significant success in exporting land-based systems. Indigenous artillery, such as the Advanced Towed Artillery Gun System (ATAGS), and rocket systems like Pinaka are now major highlights of India's export push. These battle-proven technologies are being actively marketed and sold to various international buyers, reflecting the strength of India's domestic research and manufacturing in these sectors.

188. (2) Stockholm International Peace Research Institute (SIPRI)
Entities like Munitions India Limited, Bharat Electronics Limited, and Hindustan Aeronautics Limited are key manufacturers that contribute directly to India's defense production and export volume. In contrast, SIPRI is an independent international institute based in Sweden that researches and provides data on global arms transfers, military spending, and disarmament. While it tracks India's progress in the global arms market, it is not involved in manufacturing or exporting defense equipment.

189. (3) Scaling domestic manufacturing lowers costs and boosts global competitiveness.
The Positive Indigenization Lists create a guaranteed domestic market for Indian defense companies by banning the import of certain items. This assured demand allows manufacturers to invest in large-scale production facilities. As production volume increases, the unit cost of these weapon systems typically decreases. These lower costs, combined with proven technical performance, make Indian defense products much more attractive and competitive in the international export market.

190. (1) I, II, III, and V only
India's defense exports have reached over 85 countries, with significant contributions from both the public and private sectors. The government has modernized the process by making export authorizations entirely online. Breakthrough deals, like the sale of Swathi radars to Armenia, have boosted national confidence. Importantly, India exports a full range of products, including finished weapon systems as well as various sub-assemblies and critical components for global supply chains.

191. (1) To provide information on items imported by Defence Public Sector Undertakings (DPSUs) so that Indian industry can design, develop, and manufacture them domestically
The SRIJAN portal is a central platform created to facilitate the "Make in India" initiative in the defense sector. It lists thousands of items and components that were previously imported by the military. By making this information transparent, the government encourages Indian MSMEs and private industries to take up the challenge of indigenizing these products, providing them with a clear roadmap of domestic procurement opportunities.

192. (2) A list of defense items for which there is an embargo on import beyond the timeline indicated against them, mandating domestic procurement
Positive Indigenization Lists are a strategic tool used to reduce foreign dependence. Each list contains hundreds of items that the Indian armed forces are prohibited from importing after a specific date. This policy forces a shift toward domestic sourcing, giving Indian manufacturers a clear timeline to develop and produce these systems. It ensures a steady market for indigenous technology and accelerates the process of achieving self-reliance in national defense.

193. (2) Defence Innovation Organisation (DIO)
The iDEX initiative is managed by the Defence Innovation Organisation, which is a non-profit company formed by major Defense Public Sector Undertakings like HAL and BEL. iDEX aims to

Click Here to Buy book on Amazon

controls and advanced avionics. Fifth-generation jets, like the planned AMCA, are characterized by stealth shaping, internal weapons storage, and supercruise capability, representing the current pinnacle of aerospace technology and combat performance.

146. (3) Statement I is correct but Statement II is incorrect
The AMCA is designed with an internal weapons bay to maintain its stealth profile. Carrying missiles and bombs externally on wings significantly increases the aircraft's radar cross-section, making it easy for enemy radars to detect. By tucking weapons inside the fuselage, the aircraft maintains its smooth, radar-deflecting shape, allowing it to penetrate deep into contested airspace without being noticed by early-warning systems.

147. (3) India (AMCA)
As of 2023, only a few nations have successfully developed and deployed indigenous fifth-generation stealth fighters. This elite group includes the United States with the F-22 and F-35, China with the J-20, and Russia with the Su-57. While India's AMCA program is an ambitious national project, the aircraft is still in the development and prototyping phase and has not yet been operationalized for active service.

148. (4) External drop tanks and under-wing missile pylons as standard combat configuration
Fifth-generation fighters use advanced design features like serpentine S-duct air intakes to hide engine blades and low-observable shaping to minimize radar reflections. They also feature highly integrated sensor fusion. Standard combat configurations for these jets avoid external tanks or pylons, as these components reflect radar waves and destroy the aircraft's stealth. Instead, they rely on internal fuel tanks and internal weapons bays for primary missions.

149. (3) It reduces the distance at which enemy radars track the aircraft
Reducing the Radar Cross Section (RCS) is the primary goal of stealth design. A lower RCS means that the aircraft reflects very little radar energy back to the receiver. Effectively, this allows the AMCA to get much closer to enemy positions or aircraft before it is detected and tracked. This "first look, first shot" advantage is critical for survival and mission success in modern aerial warfare.

150. (1) I, II, III, and IV only
The AMCA is a twin-engine fighter project led by the ADA, recently receiving official clearance for prototype development. Its design features stealth elements like Diverterless Supersonic Inlets to improve performance and maintain a low radar signature. While it will transform India's combat fleet, it is a fighter jet designed for air superiority and strike missions, not a transport aircraft meant to replace the C-17 fleet.

151. (4) Ministry of Electronics and Information Technology (MeitY)
The India Semiconductor Mission is a specialized division established to drive the national strategy for building a domestic semiconductor ecosystem. It operates under the Ministry of Electronics and Information Technology. MeitY provides the policy framework and financial support necessary to attract global investments and encourage indigenous research in the highly complex and capital-intensive field of semiconductor manufacturing and design.

152. (1) Design Linked Incentive
The Design Linked Incentive (DLI) scheme is a key component of the India Semiconductor Mission. It provides financial support and infrastructure to Indian companies and startups involved in semiconductor design. By offering incentives linked to the success of their designs, the government aims to foster a domestic ecosystem for Integrated Circuit (IC) design, ensuring that India contributes to the high-value research and intellectual property.

153. (3) Dholera, Gujarat
India's first major commercial semiconductor fabrication plant, or "Fab," is located in Dholera, Gujarat. This facility is being established by Tata Electronics in a strategic partnership with the Taiwanese firm PSMC. The Dholera Special Investment Region provides the necessary large-scale infrastructure, including high-quality water and stable power, required for the precision manufacturing of silicon wafers and advanced semiconductor chips.

Downloaded from www.pdf.tube

154. (1) Micron Technology - Setting up an ATMP facility in Gujarat
Micron Technology, a global leader in memory and storage solutions, is setting up a major Assembly, Testing, Marking, and Packaging (ATMP) facility in Sanand, Gujarat. This represents one of the first significant foreign investments under the India Semiconductor Mission. The facility will process semiconductor wafers into finished products, creating thousands of high-tech jobs and helping to establish a foundational supply chain for the industry.

155. (4) Setting up an ATMP facility generally requires a significantly higher capital investment than setting up a full Fab.
A semiconductor "Fab" is an extremely complex facility used to print intricate circuits onto silicon wafers, requiring billions of dollars in investment. In contrast, an ATMP facility is the final stage where these wafers are cut and packaged into usable chips. While ATMP is still technologically advanced and essential, it generally involves lower capital expenditure and faster setup times compared to the immense costs of a full-scale fabrication unit.

156. (1) Both Statement I and Statement II are correct
The Government of India has committed a substantial financial outlay of Rs. 76,000 crore to catalyze the domestic semiconductor and display industry. To attract global players and local manufacturers, the scheme offers a fiscal incentive of up to 50% of the project cost for setting up Fabs and other related facilities. These policies are designed to reduce the high entry barriers and risks associated with this sector.

157. (3) To ensure supply chain resilience by reducing geographic reliance
Building a domestic semiconductor ecosystem is a strategic priority for India to ensure national security and economic stability. Most of the world's chip production is currently concentrated in a few geographic regions, making supply chains vulnerable to geopolitical tensions or natural disasters. By manufacturing chips locally, India reduces its reliance on foreign imports and protects its diverse industries, from automotive to defense, from global supply disruptions.

158. (4) Bihar
Under the India Semiconductor Mission, several states have successfully attracted major projects. Gujarat is hosting a full Fab and an ATMP unit, while Assam has seen approval for a significant semiconductor assembly plant. Maharashtra has also recently been involved in the expansion of semiconductor facilities. As of early 2024, Bihar has not been a primary location for approved large-scale semiconductor manufacturing or ATMP projects under the central scheme.

159. (1) The severe global chip shortage experienced during and after the COVID-19 pandemic, which paralyzed automotive and electronics manufacturing
The global chip shortage during the COVID-19 pandemic served as a major wake-up call for nations worldwide, including India. The lack of semiconductors caused massive delays in the production of cars, smartphones, and medical equipment. This crisis underscored the extreme vulnerability of global supply chains and directly accelerated the Indian government's efforts to achieve self-reliance in this critical technological sector through the India Semiconductor Mission.

NODIA

160. (1) Both A and R are true and R is the correct explanation of A.
India's initial strategy in the semiconductor sector involves a mix of full Fabs and ATMP units. ATMP facilities are prioritized because they have lower capital requirements and can be established more quickly than complex Fabs. This approach allows India to build a base of skilled workers and develop a supporting industrial ecosystem, which is essential before moving into more advanced and high-cost manufacturing stages of the semiconductor value chain.

161. (2) To authorize, promote, and regulate the space activities of non-governmental private entities (NGEs) in India
IN-SPACe was established to transform the Indian space sector from a government-led monopoly into an inclusive ecosystem involving private players. As a single-window nodal agency, it facilitates the participation of private companies by providing access to ISRO's infrastructure and expertise. It also ensures that all private space activities comply with safety and security regulations, acting as a bridge between

the government and the emerging private space industry.

162. (1) To serve as the commercial arm of ISRO, enabling Indian industries to scale up high-technology manufacturing and handling commercial launch services
NewSpace India Limited (NSIL) is the commercial face of the Department of Space. Its primary mandate is to monetize the technologies developed by ISRO by transferring them to the private sector and managing commercial satellite launches. By handling the business aspects of space, NSIL allows Indian industries to manufacture rockets and satellites under license, thereby expanding India's share in the global commercial space market.

163. (3) To step away from commercial manufacturing and focus on advanced research, development of new technologies, and deep space exploration
Under the 2023 Space Policy, ISRO's role has been redefined to focus on the frontiers of science and technology. By delegating routine satellite manufacturing and launch services to the private sector and NSIL, ISRO can dedicate its resources to high-end R&D. This includes developing next-generation launch vehicles, conducting interplanetary missions, and leading human spaceflight programs like Gaganyaan, ensuring India stays at the cutting edge of global space exploration.

164. (4) SSLV is designed to be assembled on demand with quick turnaround time and lower cost to cater to the growing small satellite market.
The Small Satellite Launch Vehicle (SSLV) is specifically engineered for the rapidly growing market of mini and micro-satellites. Unlike the larger PSLV, which takes months to prepare, the SSLV can be integrated and launched within a few days by a small team. This high flexibility and low cost make it an ideal choice for commercial customers looking for frequent and affordable access to low Earth orbit.

165. (3) A-ii, B-iv, C-iii, D-i
The Indian space ecosystem involves various specialized entities. ISRO focuses on advanced research and planetary missions, while IN-SPACe regulates and authorizes private sector participation. NSIL handles the commercialization of technologies and launch services. Meanwhile, private startups like Skyroot Aerospace are actively developing their own launch vehicles, demonstrating the success of recent reforms in opening up the space sector to competitive private innovation and development.

166. (1) Both Statement I and Statement II are correct
The 2022 launch of the Vikram-S rocket, developed by the startup Skyroot Aerospace, was a historic moment for India. It was the first time a rocket designed and built by a private company was successfully launched from an Indian spaceport. This event signaled the end of ISRO's role as the sole operator of launch vehicles and proved that Indian startups could develop sophisticated aerospace technologies independently.

167. (4) Developing offensive anti-satellite (ASAT) weapon systems for commercial sale
Recent space reforms allow private entities to establish launch pads, operate communication satellites, and provide broadband services. These activities are encouraged to grow the domestic space economy. However, for national security and international treaty reasons, the development and sale of offensive military technologies, such as anti-satellite weapons, remain strictly under the control of the government and are not permitted for private commercial development or export.

168. (1) Liquid Propulsion Systems Centre (LPSC)
The Liquid Propulsion Systems Centre (LPSC) is an integral research and development unit of ISRO, focused on rocket engine technology. In contrast, Agnikul Cosmos, Pixxel, and Bellatrix Aerospace are all private Indian space startups. These private companies represent the new wave of commercial innovation in the space sector, working on launch vehicles, Earth observation satellites, and advanced propulsion systems independently of the traditional government-led framework.

169. (3) Transferring manufacturing to private sectors lowers costs via mass production.
Privatizing the manufacturing of the SSLV allows ISRO to transfer its proven technology to industrial partners who can produce the rockets at a larger scale and lower cost. This

Click Here to Buy book on Amazon

commercial approach makes Indian launch services more competitive in the global market. By freeing ISRO from routine production tasks, it also enables the agency to focus its budget and expertise on developing newer, more advanced space technologies.

170. (1) I and II only
Recent reforms have opened the space sector to significant foreign investment, with 100% FDI allowed for manufacturing satellite components. This policy aims to boost India's global market share in the space economy. To support this growth, the government actively encourages private startups to utilize ISRO's world-class testing and launch facilities, providing them with the necessary tools to validate their technologies without building expensive infrastructure from scratch.

171. (4) Kalpakkam, Tamil Nadu
The Prototype Fast Breeder Reactor (PFBR) is located at the Madras Atomic Power Station site in Kalpakkam, Tamil Nadu. This 500 MWe reactor is a key milestone in India's nuclear energy strategy, as it marks the transition to the second stage of the three-stage power programme. It is designed to produce more fuel than it consumes, ensuring long-term sustainability and efficient utilization of India's nuclear resources.

172. (2) Reprocessing spent fuel to extract materials for subsequent reactor stages
A "closed fuel cycle" is a strategy where spent nuclear fuel is not treated as waste but as a valuable resource. The used fuel is chemically reprocessed to recover fissile materials like plutonium, which are then used to manufacture new fuel for different types of reactors, such as fast breeders. this approach maximizes energy extraction from uranium and minimizes the volume of long-lived radioactive waste that requires permanent disposal.

173. (3) The coastal beaches of Kerala and Odisha
India's vast thorium reserves are found within monazite, a reddish-brown phosphate mineral. These monazite-rich sands are primarily concentrated along the coastal stretches of Kerala, Tamil Nadu, and Odisha. The easy accessibility and abundance of these coastal deposits are what make thorium a central pillar of India's long-term energy security strategy, as it provides a nearly inexhaustible source of domestic fuel for future nuclear reactors.

174. (4) Kakrapar Atomic Power Station - Gujarat
The Kakrapar Atomic Power Station is a major nuclear facility located in Gujarat. It recently achieved a significant milestone with the commercial operation of its 700 MWe indigenous reactors. Other plants like Kudankulam are in Tamil Nadu, and Narora is in Uttar Pradesh. These stations are strategically distributed to provide stable, base-load power to different regional grids across the country, supporting industrial and domestic energy needs.

175. (1) They require highly enriched uranium (over 90%) to sustain a chain reaction
Pressurised Heavy Water Reactors (PHWRs) are the mainstay of India's first stage of nuclear power. A major technical advantage of these reactors is that they use natural uranium as fuel, eliminating the need for expensive and complex uranium enrichment facilities. They utilize heavy water as both a moderator and a coolant. Modern Indian-designed 700 MWe PHWRs represent a significant achievement in domestic engineering and safety standards.

176. (1) Both Statement I and Statement II are correct
Thorium-232 is described as a fertile material because it cannot sustain a nuclear chain reaction on its own. However, when placed inside a nuclear reactor, it can absorb neutrons and undergo a process called transmutation to become Uranium-233. This new isotope is highly fissile and can be used as an excellent fuel for producing energy, which is the core principle behind the third stage of India's nuclear programme.

177. (2) To serve as a bridge to the Thorium-based third stage nuclear program
The Advanced Heavy Water Reactor (AHWR) is a unique Indian design specifically developed to expedite the utilization of thorium for power generation. It serves as a technological bridge that demonstrates the feasibility of the thorium fuel cycle. By using a mix of thorium and other fissile materials, the AHWR provides a platform to refine the systems and safety protocols needed for large-scale thorium-based energy production.

NODIA

178. (1) Bihar
Commercial nuclear power plants in India are currently operational in states like Tamil Nadu (Kudankulam, Kalpakkam), Rajasthan (Rawatbhata), Karnataka (Kaiga), and Gujarat (Kakrapar). Other facilities exist in Maharashtra and Uttar Pradesh. As of now, Bihar does not have an operational commercial nuclear power plant, although the government continues to evaluate potential sites across the country for the future expansion of the nuclear energy program.

179. (3) Boron Control Rods
In a nuclear reactor, moderators like heavy water, light water, or graphite are used to slow down fast-moving neutrons so they can effectively cause further fissions. Boron is used for a completely different purpose; because it is an excellent neutron absorber, it is used in control rods to regulate or stop the nuclear chain reaction. By inserting or withdrawing boron rods, operators can precisely control the reactor's power output.

180. (4) I, II, III, and IV
India's nuclear programme is a systematic plan to move from natural uranium to thorium-based energy. The first stage uses PHWRs, the second uses FBRs that "breed" more fuel than they use, and the third stage employs thorium-fueled AHWRs. This three-stage strategy is designed to achieve self-reliance by using plutonium from early stages to unlock the energy potential of India's massive domestic thorium reserves for long-term power generation.

181. (3) Rs. 35,000 crore (approx. $5 Billion)
The Government of India has set an ambitious target to reach Rs. 35,000 crore in annual defense exports by the fiscal year 2024-25. This goal is part of a broader strategy to transform India from a major importer of arms into a significant exporter. By promoting indigenous manufacturing and streamlining export procedures, the government aims to strengthen the domestic industry and enhance India's strategic influence globally.

182. (2) Philippines
In a landmark deal for India's defense industry, the Philippines became the first international customer for the BrahMos supersonic cruise missile system. This export agreement, worth hundreds of millions of dollars, involves the shore-based anti-ship variant of the missile. The deal is significant because it demonstrates that Indian-made high-technology weapon systems are globally competitive and capable of meeting the strategic requirements of friendly foreign nations.

183. (4) Financial loans provided to foreign nations for purchasing Indian defence gear
A "Line of Credit" is a financial tool used by the Indian government to promote defense exports. It involves providing low-interest loans to friendly foreign countries, which they can then use to purchase military equipment manufactured in India. This mechanism makes Indian defense products more affordable for developing nations, helps build long-term strategic partnerships, and supports the growth of the domestic defense industrial base through increased export orders.

184. (1) India exported the Pinaka Multi-Barrel Rocket Launcher system to Armenia amid its regional conflicts
The export of the Pinaka Multi-Barrel Rocket Launcher to Armenia is a major success for India's indigenous defense sector. The Pinaka system, developed by DRDO, is highly regarded for its precision and reliability in combat. This deal marked a significant breakthrough in the export of complex, large-scale tactical weapon systems, proving that India can provide effective and battle-proven alternatives to traditional global defense suppliers in various strategic regions.

185. (3) A-iii, B-ii, C-i, D-iv
India's growing export portfolio includes diverse and advanced military platforms. The BrahMos is a high-speed supersonic cruise missile, while Pinaka is a versatile multi-barrel rocket launcher. The Akash system provides reliable surface-to-air missile defense, and the Advanced Light Helicopter Dhruv is a successful utility aircraft. These various systems demonstrate the wide-ranging technological capabilities of India's state-owned and private defense manufacturers in meeting different operational needs for international customers.

Downloaded from www.pdf.tube

and farming. This strategic focus ensures that technological progress translates into tangible improvements in the quality of life for the entire population.

121. (3) 4.5 generation
The Tejas Mk1A is classified as a 4.5-generation fighter aircraft. It represents a significant upgrade over the initial version, incorporating modern technologies that bridge the gap between fourth-generation and fifth-generation jets. These enhancements include advanced radar systems, improved electronic warfare capabilities, and the ability to fire sophisticated beyond-visual-range missiles, making it a highly capable platform for the modern battlefield.

122. (1) Active Electronically Scanned Array
AESA stands for Active Electronically Scanned Array, a type of advanced phased-array radar. Unlike traditional radars with moving parts, an AESA radar uses a computer-controlled array of many small transmitter/receiver modules. This allows it to scan the environment faster, track multiple targets simultaneously with higher precision, and be more resistant to electronic jamming, significantly increasing the aircraft's combat effectiveness and situational awareness.

123. (4) Aeronautical Development Agency (ADA) under DRDO
The Tejas Light Combat Aircraft was designed and developed by the Aeronautical Development Agency, which is the nodal agency for the national combat aircraft program. Operating under the Department of Defence R&D, ADA collaborates with various DRDO laboratories and Hindustan Aeronautics Limited. While HAL is the primary manufacturing partner, the core design and technological development are spearheaded by the specialists at ADA.

124. (2) Astra - Indigenous Beyond Visual Range (BVR) Air-to-Air Missile
The Tejas Mk1A is designed to carry a variety of advanced weapons, including the indigenous Astra missile. Astra is a beyond-visual-range air-to-air missile capable of engaging high-speed aerial targets at long distances. Its integration into the Tejas platform is a major step toward achieving self-reliance in strategic weaponry, reducing the need for imported missiles like those from Russia or Europe.

125. (3) A-i, B-iii, C-iv, D-ii
The Tejas aircraft features several advanced aeronautical technologies. Fly-by-wire systems replace traditional mechanical controls with digital signals, while the compound delta wing provides exceptional maneuverability. The glass cockpit utilizes digital displays for pilot information, and the extensive use of composite materials reduces the aircraft's weight and radar signature. Together, these features make Tejas a modern, lightweight, and highly agile multi-role fighter.

126. (3) Statement I is correct but Statement II is incorrect
The Tejas features a sophisticated digital fly-by-wire system that manages all flight controls. Aerodynamically, the aircraft is designed to be inherently unstable to achieve superior maneuverability and agility. This instability means it cannot be flown manually without the constant, high-speed corrections provided by the onboard flight control computers. This design is a standard characteristic of modern, high-performance combat aircraft.

NODIA

127. (1) The Tejas Mk1A is currently powered by a fully indigenous Kaveri engine
The Tejas program has achieved high levels of indigenization in its airframe, mission computer, and electronic warfare suites. It also features a high percentage of indigenous carbon-fiber composites. However, the current variants, including the Mk1A, are powered by imported General Electric F404 engines. While the indigenous Kaveri engine was originally intended for the Tejas, it is still undergoing development for future applications.

128. (2) Twin-engine supercruise capability
The Tejas Mk1A is a single-engine light combat aircraft designed for agility and multi-role operations. It features mid-air refueling, advanced electronic warfare suites, and beyond-visual-range missile capabilities. However, it is not a twin-engine aircraft, nor is it designed for supercruise, which is the ability to maintain supersonic flight without afterburners. These specific features are generally reserved for larger,

create an ecosystem that fosters innovation in the defense and aerospace sectors by engaging with startups, individual innovators, and MSMEs. It provides grants and technical support to help these entities develop cutting-edge solutions for the real-world challenges faced by the Indian military.

194. (1) Defence Acquisition Procedure (DAP) - Promulgated in 2020 to promote 'Make in India' and 'Atmanirbhar Bharat' in defence
The DAP 2020 is the primary regulatory framework governing the purchase of weapons and equipment for the Indian armed forces. It was specifically designed to prioritize indigenous procurement over imports. By introducing various "Buy Indian" categories and simplifying the acquisition process, the DAP 2020 provides a strong policy push for domestic manufacturers to lead the modernization of the country's military, aligning with the vision of a self-reliant India.

195. (1) Both A and R are true and R is the correct explanation of A.
The DAP 2020 places the highest priority on the "Buy (Indian-IDDM)" category, which requires products to be indigenously designed, developed, and manufactured. This policy is based on the strategic need to reduce the risks associated with depending on foreign suppliers for critical defense technology. By encouraging domestic design from the ground up, the government ensures that the intellectual property and manufacturing control remain entirely within the country.

196. (3) Statement I is correct but Statement II is incorrect
The Strategic Partnership model aims to build a robust domestic defense industrial base by encouraging Indian private companies to partner with global manufacturers. These partnerships allow for the transfer of advanced technology and manufacturing expertise to India. This approach does not require Indian companies to work in isolation; instead, it uses international collaboration to jumpstart the indigenous production of major platforms like submarines, fighter jets, and armored vehicles.

197. (3) HAL has achieved 100% indigenization in the manufacturing of the AL-31FP engines for the Su-30MKI without Russian raw materials
HAL has made great strides in indigenizing aircraft like the Light Combat Helicopter and various electronic components. They also support MSMEs through specialized portals. However, manufacturing complex jet engines like the AL-31FP still involves some reliance on foreign technical documentation and certain specialized raw materials or components. Achieving 100% indigenization in advanced aero-engine technology remains an ongoing long-term goal for the Indian aerospace industry rather than a completed feat.

198. (2) Buy (Global - Sole Source Restricted)
The DAP 2020 is structured to favor indigenous sources through categories like "Buy (Indian-IDDM)" and "Buy (Indian)." These categories are given top priority in the procurement process to boost domestic industry. In contrast, "Buy (Global)" options, especially sole-source acquisitions from a single foreign company, are treated as a last resort. This prioritization reflects a clear shift in policy to minimize direct imports and maximize the use of Indian-made military equipment.

199. (4) Naval Materials Research Laboratory (NMRL)
The Aeronautical Development Establishment, Gas Turbine Research Establishment, and Centre for Airborne Systems are all DRDO laboratories primarily focused on the aerospace domain, including aircraft design, engines, and airborne radar systems. The Naval Materials Research Laboratory, however, specializes in the development of materials and technologies for the marine environment, such as hull steels and fuel cells for submarines, making it the exception in this group of aeronautical-focused labs.

200. (1) Establishing a self-sustaining industrial base for strategic autonomy
The ultimate strategic goal of India's defense indigenization policy is to achieve strategic autonomy. By building a self-sustaining industrial base, India ensures that its national security decisions are not constrained by the threat of foreign sanctions or supply chain disruptions. This indigenous capability allows the country to maintain its own military equipment

Click Here to Buy book on Amazon

independently, fostering economic growth through high-tech manufacturing while securing its position as a resilient and independent global power.

NODIA

Visit :
www.pdf.tube

Download PDFs For : NODIA

- ✓ MPPSC Chapterwise Question Bank
- ✓ KVS/NVS Chapterwise Question Bank
- ✓ KVS/NVS 30 Sample Papers for Tier-II
- ✓ DSSSB TGT Chapterwise Question Bank
- ✓ DSSSB Sample Papers
- ✓ Chapterwise Question Bank
- ✓ JEE NEET Foundation
- ✓ Primary Classes Worksheets
- ✓ Olympiad Guide
- ✓ Sample Papers
- ✓ Previous Year CBSE Papers
- ✓ Previous JEE, NEET and CUET Papers

Nodia Editions LLP

125, Sector 6, Vidhyadhar Nagar, Jaipur 302039

MRP ₹ 490.00